Supreme Court, U. S.
FILED
MAY 18 1978
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1977

No. 77-1640

CLARK EQUIPMENT COMPANY,
Petitioner

versus

LOUIS J. KELLER AND CYRIL N. KELLER,
Respondents

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

JACK E. TOLIVER
Circle Drive
Buchanan, Michigan 49107

FRED E. SCHULZ and
Wildman, Harrold, Allen & Dixon
One IBM Plaza
Chicago, Illinois 60611

JOHN D. KELLY,
Vogel, Brantner, Kelly,
Knutson, Weir & Bye
P.O. Box 1329
Fargo, North Dakota 58102

Attorneys for Petitioner

INDEX TO PETITION

Page

Opinions Below 2

Jurisdiction 2

Questions Presented 2

Constitutional and Statutory Provisions Involved 2

Statement of the Case 3

Reasons for Granting the Writ 4

Conclusion 15

Appendix A — Court of Appeals Opinion A1-42

Appendix B — District Court Opinion B1-96

Appendix C — Notice — Commissioner of Patents C1-2

Appendix Index (separate volume)

Title of Exhibit	Pages	Exhibit Number*
1. Keller et al Patent No. 3,151,503	1-4	53
2. Loyd Patent No. 1,623,929	5-10	84
3. Schreck Patent No. 2,336,642	11-18	85
4. Hellwarth Patent No. 1,470,078	19-25	86
5. White Patent No. 2,936,840	26-35	75
6. Butler Sketch	36	100

*Trial exhibit numbers are used in the District Court's opinion appearing in Appendix B.

TABLE OF AUTHORITIES

Page

Aluminum Company of America v. Amerola Products Corporation, 552 F.2d 1020 (3rd Cir. 1977) 5

Anderson's-Black Rock, Inc. v. Pavement Salvage Co., Inc., 396 U.S. 57 (1969) 8

Burland v. Trippe Manufacturing Company, 543 F.2d 588 (7th Cir. 1976) 6

Dann v. Johnston, 425 U.S. 219 (1976) 5

Digitronics Corp. v. The New York Racing Association, Inc., 553 F.2d 740 (2nd Cir. 1977) 6

Fred Whitaker Company v. E. T. Barwick Industries, Inc., 551 F.2d 622 (5th Cir. 1977) 5

Hotchkiss v. Greenwood, 11 Howard 248, 52 U.S. 248 (1851) 7

Graham v. John Deere Co., 383 U.S. 1 (1966) 6

Great Atlantic & Pacific Tea Company v. Supermarket Equipment Corporation, 340 U.S. 147 (1950) 7

Page

Kamei-Autokomfort v. Eurasian Automotive Products, 553 F.2d 603 (9th Cir. 1977) 6

Kearney & Trecker Corporation v. Cincinnati Milacron Inc., 562 F.2d 365 (6th Cir. 1977) 6

Lincoln Engineering Company of Illinois v. Stewart-Warner Corporation, 303 U.S. 545 (1938) 7

Reiner v. I. Leon Co., 285 F.2d 501 (2nd Cir. 1960) 9

Robbins Company v. Dresser Industries, Inc., 554 F.2d 1289 (5th Cir. 1977) 6

Rutter v. Williams, 541 F.2d 878 (10th Cir. 1976) 6

Sakraida v. Ag Pro, Inc., 425 U.S. 273 (1976) 5

Systematic Tool & Machine Company v. Walter Kidde & Company, 555 F.2d 342 (3rd Cir. 1977) 6

UNITED STATES CONSTITUTION

Page

Article 1, Section 8, Clause 8 2

STATUTES

28 U.S.C. § 1254(1) 2
28 U.S.C. § 1331(a) 3
28 U.S.C. § 1332(a) 3
28 U.S.C. § 2101(c) 2
28 U.S.C. § 2201 3
28 U.S.C. § 2202 3
35 U.S.C. § 102(b) 4
35 U.S.C. § 102(e) 13
35 U.S.C. § 103 2
35 U.S.C. § 282 10

RULES

Rules of the Supreme Court of the United States, Rule 19.1(b) 2

OTHER

B.N.A. Patent, Trademark and Copyright Journal, October 28, 1976 No. 301, at A-9 9

IN THE

Supreme Court of the United States

OCTOBER TERM, 1977

No.

CLARK EQUIPMENT COMPANY,
Petitioner,

versus

LOUIS J. KELLER and CYRIL N. KELLER,
Respondents.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

The Petitioner, Clark Equipment Company, respectfully prays that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the Eighth Circuit.

OPINIONS BELOW

The judgment and opinion of the Court of Appeals was issued on February 17, 1978 and is set forth herein at Appendix A. It is reported at 570 F.2d 778. The District Court's opinion appears at 197 U.S.P.Q. 83. It is not otherwise reported and is set forth herein at Appendix B.[1]

JURISDICTION

The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1) and Rule 19.1(b) of this Court as to the judgment of the Court of Appeals entered on February 17, 1978. This Petition for Writ of Certiorari was filed within 90 days of that date pursuant to 28 U.S.C. § 2101(c).

QUESTIONS PRESENTED

1) Whether a Court in construing 35 U.S.C. § 103 must make a finding that there has been a synergistic effect where a patent consists of a combination of old, well-known elements?
2) Whether there is a conflict between the Court of Appeals for the Eighth Circuit and other Circuit Courts of Appeals with respect to the requirement that a claimed invention which is a combination of old, well-known elements must demonstrate a synergistic effect before a patent can issue?

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

Article 1, Section 8, Clause 8 of the Constitution provides:

"The Congress shall have Power

* * *

1. Appendices included with the Petition are identified by the letter suffix "A", "B", or "C"; the separate Appendix as "App."; page references are to the designated appendix.

"To promote the Progress of Science and useful Arts by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;"

35 U.S.C. § 103 provides:

"§ 103. Conditions for patentability; nonobvious subject matter

"A patent may not be obtained though the invention is not identically disclosed or described, as set forth in section 102 of this title, if the difference between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

THE STATEMENT

The petition arises out of an appeal to the Court of Appeals for the Eighth Circuit which followed a trial on the issue of the validity of three U.S. patents licensed to Petitioner. A declaratory judgment action, Civil Action No. 4875, seeking a judicial interpretation of the license agreement and the validity of the three patents filed by Petitioner October 2, 1972, was consolidated with corresponding issues of a contract action, Civil Action No. 4839, filed by Respondents in the United States District Court for North Dakota, S.E. Division. The District Court had jurisdiction under the federal declaratory judgment statute, 28 U.S.C. § 2201, § 2202 and 28 U.S.C. § 1331(a) pertaining to a federal question as well as diversity of citizenship 28 U.S.C. § 1332 (a). Of the three patents, U.S. patent No. 3,151,503 (the '503 patent) entitled "Transmission System", filed in the Patent Office December 1, 1958, and issued on October 6, 1964, was adjudged valid at trial and sustained on appeal in a judgment issued February 17, 1978. All four claims

of the patent are involved.

In the briefest terms, in prior art forward and reversing rotary friction drives using belts, sprockets and pulleys for powering a vehicle wheel, there was a problem with the belts working as clutches. They tended to slip and become overheated under load causing a loss of driving and steering control. Common disc clutches, known for use in other rotary friction drives, but for higher load applications, were installed by Respondents in place of the belts-as-clutches. With the load now within the capacity of the disc clutches, the slipping problem was solved. Although both types of rotary friction drives were known to be old in their respective load ranges, the contention is that the mere substitution of disc clutches from the higher load range to the lower range was novel, nonobvious and patentable.

Petitioner says that the combination patented has nothing new in it under 35 U.S.C. § 102(b) and § 103. The disc clutches did exactly what was expected. They performed no new function in the lower load application not performed in the higher. Patents should be issued to "promote the Progress of Science and useful Arts . . . Art. 1, Sec. 8, Cl. 8; and should not be issued to remove existing knowledge from the public domain or to limit access to simple mechanical elements already available.

REASONS FOR GRANTING THE WRIT

THE DECISION BELOW CONFLICTS WITH THIS COURT'S DECISION IN *SAKRAIDA* v. *AG PRO, INC.* AS WELL AS THE DECISIONS OF OTHER CIRCUIT COURTS OF APPEALS THAT REQUIRE THAT THERE BE A SYNERGISTIC EFFECT BEFORE A COMBINATION OF OLD, WELL-KNOWN ELEMENTS CAN BE FOUND TO BE PATENTABLE

This Petition is directed to the questions of whether the Court of Appeals for the Eighth Circuit failed to follow the law

established by this Court in *Dann* v. *Johnston,* 425 U.S. 219 (1976) and *Sakraida* v. *Ag Pro, Inc.*, 425 U.S. 273 (1976) and whether there is a conflict between the Court of Appeals for the Eighth Circuit, and the Courts of Appeals in certain other circuits, with respect to the application of *Dann* and *Sakraida* to the requirements of 35 U.S.C. § 103.

In *Sakraida, supra,* this Court analyzed the mandate of the Constitution, the statutory requirement of "nonobviousness" found at 35 U.S.C. § 103, and certain of its prior decisions. This Court then reiterated its test for the "nonobviousness" requirement of 35 U.S.C. § 103. Essentially, in those circumstances where a claimed invention is a combination of old, well-known elements, then the resulting combination must perform in a synergistic manner, that is, "resulting in an effect greater than the sum of the several effects taken separately."

Petitioner believes that *Sakraida* required both the District Court and the Court of Appeals to apply a test of "synergism" to the analysis of whether the claimed invention was "nonobvious" within the meaning of 35 U.S.C. § 103. However, neither the District Court nor the Court of Appeals made such an analysis. Indeed, the Court of Appeals expressly declined to ". . . address the question of whether or not a synergism analysis was mandatory on the facts here." at A 17.

A series of opinions of the various Circuit Courts of Appeals has strictly followed the mandate of this Court. For instance, the Court of Appeals for the Fifth Circuit in *Fred Whitaker Company* v. *E. T. Barwick Industries, Inc.*, 551 F.2d 622, 631 (5th Cir. 1977) made specific references to synergism: "We find no synergistic interplay of these in the patented process, which is but a consecutive series of discrete and independent steps."

In *Aluminum Company of America* v. *Amerola Products Corporation,* 552 F.2d 1020 (3d Cir. 1977), the Court of Appeals for the Third Circuit at page 1023 referred to the steps taken by the District Court:

"The district court concluded that the Amerola patent was merely a combination of known elements with no change in their respective functions, an aggregation demonstrating only mechanical skill, not invention, and achieving no synergistic result."

It is this analysis which Petitioner requested both the District Court and the Court of Appeals to make after ascertaining any differences between the subject matter of the '503 Patent and the prior art in accordance with the basic factual inquiry required in *Graham* v. *John Deere Co.* 383 U.S. 1 (1966). Petitioner believes that neither court made this determination as required by *Sakraida.* Other Courts of Appeals have expressly made a definitive synergism analysis. See: *Kearney & Trecker Corporation* v. *Cincinnati Milacron, Inc.*, 562 F.2d 365 (6th Cir. 1977); *The Robbins Company* v. *Dresser Industries, Inc.*, 554 F.2d 1289 (5th Cir. 1977); *Kamei-Autokomfort* v. *Eurasian Automotive Products*, 553 F.2d 603 (9th Cir. 1977); *Digitronics Corp.* v. *The New York Racing Association*, 553 F.2d 740 (2d Cir. 1977); *Systematic Tool & Machine Company* v. *Walter Kidde & Company*, 555 F.2d 342 (3d Cir. 1977); *Burland* v. *Trippe Manufacturing Company*, 543 F.2d 588 (7th Cir. 1976); and *Rutter* v. *Williams*, 541 F.2d 878 (10th Cir. 1976).

Nowhere in the District Court's Findings of Fact and Conclusions of Law is there a mention of "synergism", nor any finding that the whole is greater than the sum of the parts. The District Court ignored *Sakraida.* The Court of Appeals acknowledged the point stating,

"The District Court's memorandum opinion does not contain an explicit analysis of synergism." at A 17[2];

but rationalizes that the District Court was not required to meet the test for synergism because of the more "complex elements" in the combination and moreover;

2. See also note 4, *infra* p. 11

"In the patent law context, 'synergism' has no talismanic power; synergism is merely one indication of nonobviousness." at A. 17

Petitioner respectfully submits that this is not the law. The District Court did not scrutinize the claimed invention to determine whether the combination was, indeed, something more than the sum of parts and no amount of rationalization that synergism does not apply to "complex element" and is "merely one indication of nonobviousness" can change that fact. This Court has established that synergistic effect is much more than one indication of nonobviousness. When the claimed invention is merely a combination of old elements, synergism is the *essence* of nonobviousness.

A series of cases decided by this Court over the past 100 years has interpreted the mandate of the Constitution, Art 1, Sec 8, Cl. 8. with respect to the issuance of patents. In *Hotchkiss* v. *Greenwood*, 11 Howard 248, 52 U.S. 248 (1851) the mere substitution of materials was not "invention".

In *Lincoln Engineering Company* v. *Stewart-Warner Corporation*, 303 U.S. 545, 549 (1938), this Court stated: "The mere aggregation of a number of old parts or elements which, in the aggregation, perform or produce no new or different function or operation than that theretofore performed or produced by them, is not patentable invention".

In *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.* 340 U.S. 147 (1951), this Court construed a combination of old elements and formalized the test of synergism: "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable." *Id.* at 152.

A & P was followed by *Graham, supra* in which this Court reaffirmed and redefined the basic test of patentability.

Graham was followed by *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co., Inc.*, 396 U.S. 57 (1969), which involved

another combination patent. This Court stated: "The question of invention must turn on whether the combination supplied the key requirement." *Id.* at 60. To be "nonobvious" the combination of old elements had to act in a synergistic manner. The standard of invention is determined in light of the factual findings required by *Graham supra*, i.e., the scope and content of the prior art are to be determined, the differences between the prior art and the claims at issue are to be ascertained, and the level of ordinary skill in the pertinent art resolved. *Id.* at 17. Once these facts are determined, then the question of obviousness is to be decided. The Petitioner believes this Court has recently sent a positive and clear signal that the standard of 'invention" or "nonobviousness" is to be consistently applied within the "general strictness" requirement laid down in *Graham Id.* at 19. The three pronged factual inquiry, especially for a combination of old elements, is to be followed by a definitive determination of invention meeting this Court's mandate for a stricter standard. Not until *Sakraida*, when this Court restated the synergism requirement, did the Patent Bar and the lower Courts begin to reread *Graham* and follow closely the "general strictness" mandate.

Since this Court's decision in *Sakraida*, the Courts of Appeals for the Second, Third, Fifth, Sixth, Seventh, Ninth and Tenth Circuits have found that combination patents are invalid unless there is a synergistic effect from the combination. In contrast, Petitioner believes that the Court of Appeals for the Eighth Circuit has not followed this Court's instructions.

An example of a Court of Appeals closely following *Sakraida* is *Digitronics Corp.* v. *New York Racing Association, Inc.*, 553 F.2d 740 (2d Cir. 1977). This case involved a tote system for use in paramutual betting at race tracks. The Court found that the substitution of solid state electronic components in the tote system for electro-mechanical devices, while new in this application, were not new to data processing in other fields and merely brought to the tote field the increased accuracy, speed, compactness and flexibility of solid state electronics. Despite heavy reliance by the patentee on "commercial success" under the patent authority of Judge Learned Hand in *Reiner* v. *I. Leon Co.*, 285 F.2d 501 (2d Cir. 1960), the Court concluded that ". . . this view does not represent the current law . . ." and such secondary considerations could not play a part in the determination of "invention" after *Sakraida supra* at 748. Contrast this with the District Court's reliance in the present case on Judge Hand's opinion in *Reiner* and "commercial success" at B9, 30.

Recently a Congressional aide, speaking before the Industrial Research Institute noted that,

> "Earlier this year, the Supreme Court declared invalid a patent on a drainage system for discarding manure in barns — basically, a sheet of water going down hill. To patent lawyers, this unanimous decision was unconscionable and anti-patent. To the rest of the country, the fact that such a patent issued in the first place, let alone litigated to the highest Court of the land, was unconscionable."[3]

The Court of Appeals in this case followed the same analysis which appears to have been followed by the Patent Office in allowing the '503 patent to issue in the first place. This Court in *Graham, supra*, at p. 18 observed ". . . a notorious difference between the standards applied by the Patent Office and by the Courts." This Court went on to state that one reason for this discrepancy ". . . may well be the free rein often exercised by Examiners in their use of the concept of 'invention.' " Hence, this Court issued its instruction in *Graham* that adherence was to be had to the "general strictness" standard of invention. But, there are fundamental and divergent interests involved. The Patent Office, like any bureaucracy, is jealous of its bureau-

---

3. B. M. Nash, Assistant Counsel, Sub-Committee on Antitrust and Monopoly, United States Senate, October 18, 1976, speech as reported in B.N.A. Patent, Trademark and Copyright Journal, October 28, 1976, No. 301, at A-9.

cratic prerogatives and resists any outside influence that would tamper with the machinery of issuing thousands of invalid patents each year, even though debilitation of the entire patent system and its own long term best interests are at stake. For a general discussion of this see *A and P supra*, at 154 (concurring opinion).

Soon after *Sakraida*, the Commissioner of Patents felt compelled to inform the Examiner Corps in July, 1976 that it should adhere to the "obviousness" test as interpreted by the Patent Office and to make no changes in light of *Sakraida* which the Commissioner opined was "somewhat stringent" in the application of the *Graham* inquiry. The directive concluded by suggesting that the Supreme Court's stricter application of obviousness test to the *Graham* findings was limited to the "fact circumstances" in *Sakraida*, 939 OG 3 (August 3, 1976); see Appendix C to this petition where the Commissioner's notice is fully set forth.

There can be no presumption of validity — or administrative correctness — when the agency charged by law with applying the correct legal standard fails to acknowledge this standard. Thus the presumption of validity under 35 U.S.C. 282 is not conclusive and can be rebutted even where the references relied upon were thoroughly considered by the Patent Office, Cf. *Dann, supra.*

Recent decisions by this Court, already discussed, were not followed by the Court of Appeals in the present case. The Court of Appeals distinguished *Sakraida, supra,* as being restricted to a trivial type of water system to flush dairy barns; *Anderson's-Black Rock* to hanging a radiant burner on the side of a paving machine; and *A & P* to a frivolous frame for sliding groceries along a counter. at footnote 10, A 17.

The Court of Appeals fell into the same error in the application of the *Graham* "general strictness" requirement as the Patent Office by relegating this Court's standard of invention for combinations to those having a "basicness and simplicity"

thus artificially restricting what this Court has intended to be a *general* legal standard of invention. By attempting to limit the "general strictness" standard of invention to the "fact circumstances" of so called simpler inventions, the Court of Appeals lends continued support to that considerable body of "contrary opinion" this Court has for so long been trying to change.

The Court of Appeals, therefore, found that there was no "talismanic power", at A 17, in synergism so far as the patent law was concerned which allowed it to conclude, erroneously Petitioner believes, that "synergism" is merely one indication of nonobviousness.[4] By declining to apply this Court's standard of invention to the "gap", at B 31, as perceived existing by the District Court between the prior art belt-as-clutch drives and the disc clutches, the Court of Appeals perpetuated an error of law. Stated in, *Dann supra*, at p. 230;

"... [T]he mere existence of differences between the prior art and an invention does not establish the invention's nonobviousness. The gap between the prior art and respondent's system is simply not so great as to render the system nonobvious to one reasonably skilled in the art."

THE COURT OF APPEALS ERRONEOUSLY MADE A DETERMINATION OF NONOBVIOUSNESS UNDER 35 USC 103 WHERE THE PRINCIPAL DIFFERENCES FROM THE PRIOR ART AND THE CLAIMED INVENTION LAY IN THE MERE SUBSTITUTION OF ONE

---

4. The Court of Appeals chastised the Petitioner for not having specifically raised synergism prior to or during the trial. Petitioner respectfully believes that the Court of Appeals did not consider the sequence which certain events occurred: The trial ended on May 21, 1975, Clark's First Post Trial Brief was filed on March 24, 1976 and this Court decided *Sakraida* on April 20, 1976. Thus, with "synergism" being emphasized by this Court as the acid test for patentability of combination inventions in the *Sakraida* opinion, Clark did indeed ask the District Court in its Reply Brief filed May 11, 1976, which was the first opportunity to do so in the post trial briefing, to consider the application of *Sakraida* to the facts in this case.

TYPE OF FRICTION CLUTCH PERFORMING IN A KNOWN MANNER FOR ANOTHER TYPE OF FRICTION CLUTCH GIVEN THE LEVEL OF SKILL AT THE TIME OF THE ALLEGED INVENTION EQUIVALENT TO THAT OF A GRADUATE ENGINEER.

The District Court perceived a "gap" existing between the prior art belt-as-clutch drives and the "installation of clutches" as a solution to the slipping problem, at B 31. Yet in finding of Fact No. 48, the level of ordinary skill in the art at the time the invention was made was considered to be;

> "... someone who has had some experience in machine design or the application of engineering principles, a person who has been exposed to different types of mechanical mechanisms, such as a graduate engineer or a person with experience gained in the field." at B 22.

Both the District Court and the Court of Appeals simply eschewed any attempt to grapple with the legal point involved. The Courts failed to explain how the substitution of clutches in disc form for clutches in belt form, in the light of the prior art teaching these two mechanical elements in side-by-side application had left any perceived "gap", even to the unskilled, let alone to a graduate engineer. Petitioner, therefore, contends

that at the level of skill applied, there was no perceptible "gap" between the claims of the '503 patent and the prior art available either to the Patent Office[5] or the District Court, although the latter had the benefit of prior art not available to the Patent Office.[6]

The District Court found that the Respondents' "invention" came into being when they substituted common disc clutches for the "belt-as-clutch" mechanism. There was no dispute that the substitution of friction plate clutches for belts was a logical and common step where additional torque had to be transmitted. One of the Petitioners expert witnesses, John Butler, testified, without contradiction, to the effect that the substitution of disc clutches for the belt-as-clutch arrangement would

---

5. The relevant clutch parts of the '503 patent, App. 1, are colored, and their operation described at 3, to correspond with the similar parts in the patents cited as prior art by the Patent Office, viz., *Loyd* patent 1,623,929, App. 7, *Schreck* patent 2,336,642, App. 12, and description at 14 and *Hellwarth* patent 1,470,078, App. 19, 20 and description at 23, 24.

6. The *White* patent No. 2,936,840, App. 26-35, depicts a windrower similar to that described to the Respondents by Mr. Velo, but Mr. Velos' testimony does not form the basis for the *White* patent as prior art, as erroneously concluded by the Court of Appeals, at A 14, rather, the *White* patent stands as prior art independently under 35 USC 102(e), "... the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent ...".

be used where the latter had reached its capacity.[7] This was a common-sense approach. Since the torque was within the transmission capacity of the disc clutches, the slipping problem was solved. The District Court and the Court of Appeals viewed the mere substitution of disc clutches for the belt-as-clutch mechanism to be novel, nonobvious and patentable.

The District Court referred to a "gap" between the prior art and the claimed invention. However, the "gap" was filled by well known devices. The disc clutches did exactly what was expected. They performed no new function. The only "gap" which was crossed by installing the new clutches was one of efficiency, not invention.

---

7. The Butler sketch is shown at App. 36 and depicts the substitution of disc clutches and actuator from *Schreck* and *Hellwarth* for the prior art belt-as-clutch arrangement similar to the *White* patent. Butler testified at the trial without contradiction in connection with this sketch as follows:

Q. "Given this problem with the Velo drive [which Butler described as equivalent to the *White* disclosure] would this in your opinion be a minor substitution to make of the Schreck and the Hellwarth substitutions as you have just made it, solve the problem?

A. I believe it would be a possible solution that one would think of when confronted with the problem of the belt-as-clutch drive wearing out, to say, 'This clutch is wearing out; my other clutches don't wear out.'

Q. What other clutches?

A. 'The one in my car or my tractor.'
But those clutches don't rely on belts; those are disk clutches.

Q. What is there — some may have frictional drives where the belt drive reaches its capacity and then you go on to some other drive?

A. Yes, there is.

Q. What would that be, sir?

A. The limiting factor in clutches is the pressure between the contacting surfaces. Disk clutches provide much greater area. The area provided in this belt is fairly small and confined to the portion of the belt that's in contact with the pulley. The area in contact in the disk clutch is, can be made as generous as possible. And if the disk clutch is unsatisfactory we may add more plates as Hellwarth, as shown not in this figure of Hellwarth (indicating)." Transcript, pgs. 196, 197, February 21, 1975.

CONCLUSION

Reduced to its simplest terms, the Court of Appeals rationalized the failure of the District Court to make a synergistic analysis in accordance with the "general strictness" of this Court. The issue here is purely one of law. This Court's recent decisions are beginning to take hold but there is a substantial body in opinion which has a long standing vested interest in maintaining a lower standard of invention. This interest will seek any semantic excuse for not applying the stricter standard of invention of this Court. The conflict will continue to the detriment of the patent system as a whole. Only by continued and persistent efforts by this Court will the *Graham* "general strictness" standard become the uniform legal standard of invention.

The Petition for a Writ of Certiorari to the Court of Appeals for the Eighth Circuit should be granted so that the Judgment and Opinion in this case may conform to, instead of conflict with, the holdings of this Court and other Courts of Appeals in the cases referred to above.

Respectfully submitted,

JACK E. TOLIVER
Circle Drive
Buchanan, Michigan 49107

FRED E. SCHULZ and
WILDMAN, HARROLD, ALLEN & DIXON
One IBM Plaza
Suite 3000
Chicago, Illinois 60611

JOHN D. KELLY, and
VOGEL, BRANTNER, KELLY,
KNUTSON, WEIR & BYE
P.O. Box 1329
Fargo, North Dakota 58102
Attorneys for Petitioner

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the above and foregoing Petition has this date been served upon opposing counsel of record by placing same in the United States Mail, postage prepaid and properly addressed.

Dated:_____ _____

UNITED STATES COURT OF APPEALS
FOR THE EIGHTH CIRCUIT

Clark Equipment Company and
Clark Equipment, A.G.,
Appellants-Appellees,

versus

Louis J. Keller and Cyril N. Keller,
Appellees-Appellants.

Nos. 76-1918 and 76-2009

Appeals from the United States District Court for the District of North Dakota

Submitted: August 31, 1977
Filed: February 17, 1978

Before GIBSON, Chief Judge, HEANEY and WEBSTER, Circuit Judges.

GIBSON, Chief Judge.

The two consolidated cases underlying the present appeal and cross-appeal arise out of a patent license contract whereunder Louis and Cyril Keller, residents of North Dakota, granted exclusive licenses on three interrelated patents to Clark Equipment Company, a corporation incorporated under the laws of Delaware and with its principal place of business in Michigan. In a similar license agreement, the Kellers granted to Clark Equipment A.G. (CEAG), a Swiss corporation which is a wholly owned subsidiary of Clark, an exclusive license under certain foreign patents corresponding to the licensed patents in the

agreement with Clark. The patents involved relate to self-propelled, three- and four-wheel skid steer loader vehicles manufactured by Clark in Gwinner, North Dakota. Patent 3,151,503 (503 patent) is a mechanical patent entitled "transmission system"; Patent 3,231,117 (117 patent) is a mechanical patent entitled "tractor vehicle and drive therefor"; Patent 195,254 (254 patent) is a design patent entitled "self-propelled loader."

CIVIL ACTION 4875

In October 1972, Clark filed a civil action against the Kellers pursuant to 28 U.S.C. § § 2201 and 2202, seeking a declaration of the rights and obligations of the parties under their license agreement and alleging that because the three patents forming the subject matter of the license were invalid, the license contract was unenforceable. This declaratory judgment action, which was filed in the Western District of Michigan, was transferred to the District of North Dakota in August 1973. In September 1973, the Kellers filed an answer and counterclaim. The counterclaim was for royalties allegedly due from Clark under its license agreement with the Kellers and under certain non-exclusive sublicense contracts between Clark and others. In their counterclaim, the Kellers also alleged that Clark or its predecessor in interest, the Melroe Company, had been negligent in failing to comply with the requirements of 35 U.S.C. § 102(b) by neglecting to file a patent application on the 117 patent within the one-year period after the invention had been in public use or on sale.

In response to this negligence claim, Clark filed a third-party complaint against the law firm of Williamson, Bains and Moore as third-party defendant. Clark alleged that if there had been negligence in the filing of the application for the 117 patent, it had been that of the third-party defendant, who had represented Louis Keller and Clifford Melroe, the joint inventors of the mechanism underlying the 117 patent, and who had had a

professional obligation to investigate the facts and see that the application was timely filed. The cases presently before this court do not include issues of negligence or possible liability for late filing of the 117 patent application, for on April 29, 1974, the District Court[1] ordered that Clark's third-party complaint and that portion of the Kellers' counterclaim pertaining to these issues be tried separately from and after the present declaratory judgment action was tried.

CIVIL ACTION 4839

On July 25, 1973, the Kellers filed a separate action against Clark in the District of North Dakota. This action, which embodied the allegations in the answer and counterclaim for royalties due filed in Civil Action 4875, named CEAG as an additional defendant. The complaint alleged that, pursuant to a license agreement with the Kellers, CEAG was an exclusive licensee under certain foreign patents corresponding to the licensed patents in the agreement with Clark, and that CEAG had failed to account for and pay royalties due thereunder. Jurisdiction was based upon diversity of citizenship. This action was consolidated with Civil Action 4875 on December 21, 1973.

CONSOLIDATED ACTIONS

CEAG responded to the complaint in Civil Action 4837 with motions to dismiss in which it alleged lack of in personam jurisdiction, absence of proper service of process and failure of proper jurisdictional amount. The District Court denied these motions, *Keller v. Clark Equipment Co.*, 367 F. Supp. 1350 (D.N.D. 1973); CEAG reasserted its jurisdictional defenses in its answer.

---

1 The Honorable Paul Benson, Chief Judge, United States District Court for the District of North Dakota.

On July 18, 1974, the District Court ordered a separate trial on the issue of the validity of the three patents. The trial on this severed issue ran for some 33 days in early 1975. The 30-volume trial transcript includes the testimony of 46 witnesses; 546 exhibits were also introduced into evidence. Following the trial, the district judge filed a lengthy, unpublished memorandum opinion in which he ruled that the 503 and 254 patents were valid, and that the 117 patent was invalid. Clark appeals the judgment of the District Court on all three patents; the Kellers cross-appeal on the 117 patent. CEAG appeals from the District Court's rulings on its jurisdictional allegations and defenses.

JURISDICTIONAL ISSUES

Before addressing the merits of the patent issues raised on this appeal and cross-appeal, we will consider CEAG's jurisdictional contentions. The District Court initially rejected CEAG's jurisdictional defenses in a memorandum opinion directed solely to this issue and entered prior to trial. *Keller v. Clark Equipment Co.*, 367 F. Supp. 1350 (D.N.D. 1973). CEAG has continued to assert a lack of in personam jurisdiction. In its lengthy memorandum opinion on the patent validity issues of this case, the District Court did not re-analyze CEAG's jurisdictional assertions. It simply took note of their continuing nature and cited its previous opinion denying CEAG's jurisdictionally based motion to dismiss.

In its initial consideration of CEAG's motion to dismiss, the District Court made the following findings of fact and inferences therefrom relative to jurisdiction over CEAG. CEAG, a corporation organized under the laws of Switzerland, is a wholly owned subsidiary of Clark, a Delaware corporation

doing business in North Dakota. The present case concerns separate manufacturing licenses between Clark and the Kellers, who are residents of North Dakota, and CEAG and the Kellers. Each agreement was executed on May 19, 1971. The Clark-Keller agreement was subscribed by J. Becket (sic), as vice-president of Clark Equipment Company. The CEAG-Keller agreement was also signed by J. Becket (sic), this time in the capacity of vice-president of CEAG. Both agreements give Clark's Buchanan, Michigan, address for purposes of notice to the licensee and provide for continuing royalty payments to be made to the Kellers, residents of North Dakota. In the instant case, service on CEAG was made pursuant to Fed. R. Civ. P. 4(d)(7) by serving the summons and complaint on an officer of Clark at its Melroe Division in Gwinner, North Dakota. CEAG maintains a liaison engineering employee at the Melroe Division of Clark in North Dakota.

It can be reasonably inferred that CEAG became aware of the patents through its close association with the Melroe Division of Clark. Moreover, the factual situation here supports the inference that CEAG, or someone from Clark acting on behalf of CEAG, contacted the Kellers in North Dakota about the foreign patents, in contemplation of securing a European arrangement analogous to Clark's American arrangement exploiting the domestic patents in question. Irrefutably, CEAG sought out the Kellers in North Dakota, and the Clark-Keller and CEAG-Keller licensing agreements were handled by Clark's counsel for both Clark and CEAG. In this transaction, it clearly appears that Clark was acting for and on behalf of its wholly owned subsidiary, CEAG, and that the same individual signed both agreements on behalf of Clark and CEAG.

We have reviewed the record as a whole, giving particular attention to the documents from which the bulk of the District Court's jurisdictional findings and inferences are derived, and

we can find no basis for rejecting these findings as clearly erroneous.[2] Moreover, we believe that they provide adequate support for the District Court's conclusions that CEAG had "minimum contacts" with North Dakota, which rendered in personam jurisdiction proper, and that even though CEAG itself was not doing business in North Dakota, CEAG and Clark were inextricably involved with the Kellers in the negotiations and execution of the patenting licensing agreements.

CEAG attacks the District Court's jurisdictional conclusion on several bases. We have considered its contentions in light of the District Court's careful analysis of this issue and find them to be without merit. Presence by the defendant in the forum state is not a jurisdictional prerequisite. *McGee v. International Life Insurance Co.*, 355 U.S. 220, 222-23 (1957); *Electro-Craft Corp. v. Maxwell Electronics Corp.*, 417 F.2d 365, 369 (8th Cir. 1969). It is only necessary that the defendant have sufficient minimum contacts with the forum state so that requiring it to defend itself there will not offend traditional notions of fair play and substantial justice. *International Shoe Co. v. Washington*, 326 U.S. 310, 316 (1945); *Aaron Ferer & Sons Co. v. Atlas Scrap Iron & Metal Co.*, 558 F.2d 450, 454 (8th Cir. 1977). The District Court found that service had been made in compliance with the law of North Dakota[3] and that there were minimum contacts between CEAG and North Dakota in CEAG's licensing

2 CEAG takes particular exception to the District Court's finding that CEAG had a liaison officer at the Melroe Division of Clark in Gwinner, North Dakota. We do not believe that this finding has been shown to be clearly erroneous. Moreover, we note that even if it be assumed that there was no liaison officer in North Dakota, there remains adequate factual support in the record for the District Court's jurisdictional conclusion.

3 Pursuant to Rule 4(d)(2)(D) of the North Dakota Rules of Civil Procedure, service of process may be made within the state on a foreign corporation by delivering a copy of the summons "to one who acted as an agent for the defendant with respect to the matter upon which the claim is based and who was an agent of the defendant at the time of service."

agreement with the Kellers, who are residents of North Dakota, and in its extremely close relationship to its parent corporation, Clark, which did business in North Dakota. The District Court did not consider the mere existence of a parent-subsidiary relationship adequate to establish minimum contacts with North Dakota. This relationship was merely one of several factors which added up to the requisite minimum contacts for in personam jurisdiction. We find neither factual nor legal error in the District Court's disposition of CEAG's jurisdictional defenses and agree that there is in personam jurisdiction over CEAG.

PATENT ISSUES

The complexity of this case compels individual analysis of each patent. Certain facts are common to all three patents, however, and we believe that their recitation here will provide an appropriate general introduction to the purposes and nuances of the individual patents.

The Kellers originally granted an exclusive license on the three patents at issue here to Melroe Manufacturing Company (Melroe) in 1964. In 1969, Clark acquired Melroe and succeeded to its rights under the license agreement with the Kellers. In 1971, Clark and the Kellers entered into a new licensing agreement which superseded the 1964 Melroe-Keller agreement and which contained a clause based upon *Lear v. Adkins*, 395 U.S. 653 (1969), specifically permitting Clark to challenge the validity and scope of the licensed patents.

The three patents in dispute in this litigation have been involved in two previous lawsuits. In the first action, which was filed and concluded before Clark acquired Melroe, the Kellers and Melroe sued Universal Manufacturing Company (Universal) in the Eastern District of Virginia for infringement of the 503, 117 and 254 patents. This suit was settled out of court. Pursuant to a stipulation containing an acknowledgment of the

validity of the three patents, a consent decree and judgment were entered. By this settlement, Universal took a sub-license from Melroe on the three patents and agreed to pay royalties to Melroe J. I. Case Company subsequently purchased Universal and acquired its rights under the Melroe-Universal license agreement.

In 1968, these patents engendered a second round of litigation, when Owantonna Manufacturing Company (Owantonna) sued Melroe and Cyril Keller in the District of Minnesota in an effort to have the 503, 117 and 254 patents declared invalid.[4] Clark was substituted as party defendant after its acquisition of Melroe in 1969. This suit also ended in a settlement which incorporated an agreement whereby Owantonna was granted a sub-license by Clark on the three patents.

503 PATENT

Louis Keller and his brother Cyril operated a general repair and blacksmith shop in Rothsay, Minnesota, during the 1950's. In 1954, the Kellers became acquainted with Eddie Velo, a local grain and turkey farmer. In the early summer of 1956, Velo discussed with the Kellers the problems he had experienced in having manure accretions removed from his turkey barns. The barns had to be cleaned by hand, because their structure precluded the use of any mechanical loaders or tractors then available to Velo. Velo wanted to mechanize the cleaning process, and he envisioned a light, highly maneuverable loader vehicle as a desirable means of doing so. He described to the Kellers the type of machine which he felt would be necessary, citing as an example an Owantonna windrower he had once owned, which, he believed, had had a separate reverse and forward belt drive on each side and a caster wheel arrangement in the rear.

---

4 See *Owantonna Mfg. Co., Inc. v. Melroe Co.*, 301 F. Supp. 1296 (D. Minn. 1969), which pertains to the preliminary stages of this litigation.

After contemplating the Velo barn cleaning problem during the summer of 1956, the Kellers presented a free-hand sketch of a loader to Velo. Pursuant to an understanding that Velo would pay for materials and compensate them for out-of-pocket costs and some of their labor, the Kellers began building a self-propelled loader in late October 1956. Because of their elementary design methods, the Kellers invented as they built. The Velo loader, which took approximately three months to complete and was delivered to Velo in February 1957, incorporated a rear-mounted engine, a belt drive to two forward driving wheels, and a single free-castering rear wheel. In March 1957, Velo paid the Kellers $1,349.00 as compensation for parts, material and some of the labor that went into building the loader.

The relationship between the Kellers and Velo was one in which the Kellers were kept closely advised of the loader's performance and were allowed unlimited access to the machine. Between February 1957 and the summer of 1958, the Kellers modified and improved the Velo loader, which manifested certain operational problems. The most serious problem concerned the loader's belt drive. The shifting of the loader's idler lever created friction and heat which caused the drive belts on each side of the loader to stretch. The stretching resulted in a loss of driving power in both forward and reverse. When the belt on one side alone stretched, the loader would drive only in circles. These problems prompted the Kellers to develop a clutch system that would eliminate the belt drive. During the spring of 1958, they constructed a test plate resembling the side plate of the Velo loader. Upon this plate, they began to develop the clutch assembly which ultimately became the transmission system covered by the 503 patent. Around the end of July 1958, the cam-actuated clutch drive mechanism recited in each of the four claims of the 503 patent was installed in the Velo loader. The cam-actuated clutch drive provided more positive, responsive and reliable steering, starting and stopping control.

Prior to December 1, 1957, the critical date under 35 U.S.C. § 102(b)[5] with respect to the 503 patent, the Kellers built no other loaders. In January or February 1958, they built several loaders equipped with the belt drive used in the original Velo loader rather than the cam-actuated clutch drive assembly covered by the 503 patent. Three of these loaders were delivered to Jenoff, Inc. of Fergus Falls, Minnesota, in the spring of 1958, but the record contains no evidence that the Kellers were in contact with Jenoff about their loader prior to December 1, 1957.

The application for the 503 patent was filed on December 1, 1958. The 503 patent, entitled "transmission system", contains four independent claims, each of which is specifically directed to a particular cam-actuated clutch drive mechanism having independently rotatable propulsion wheels which may be independently actuated by the drive mechanism for driving the vehicle backward or forward and for steering it. The 503 patent, which is a mechanical patent of 17 years' duration, was granted to the Kellers by the Patent Office on October 6, 1964. The District Court sustained the validity of the 503 patent.

In arguing on appeal that the trial court erred in holding the 503 patent valid, Clark impugns the correctness of essentially every step in the exhaustive factual and legal analysis made by the District Court. We will address Clark's contentions seriatim, after briefly introducing the basic tenets of patent law that must be applied to determine the validity of all three of the patents at issue here.

In order to be patentable, an invention must be useful, novel and nonobvious. The utility of the inventions patented here is not in question; the parties contest only the issues of novelty,

---

5 To be patentable under § 102(b), the invention must not have been "in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States." The date one year prior to the date of application is often referred to as the critical or statutory bar date with respect to the invention sought to be patented.

or compliance with the patent requirements of § 102(b), and nonobviousness. The standards for determining whether an invention possesses novelty are set forth in 35 U.S.C. § 102. For the purposes of this first inquiry, we are concerned only with that aspect of 35 U.S.C. § 102(b) which precludes patentability where an invention has been in public use or on sale in this country more than one year prior to the date of the application for patent in the United States.

Insofar as the requirement of nonobviousness is concerned, 35 U.S.C. § 103 sets forth the standard for determining whether the subject matter of an invention is nonobvious.

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35 U.S.C. § 103. The Supreme Court has fleshed out the skeletal framework of § 103 by providing guidelines for making an analysis of nonobviousness.

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966). Clearly, the test for nonobviousness requires basic factual as well as legal inquiries, *Graham v. John Deere Co., supra* at 17, and is one that must be resolved upon a case-by-case analysis. *Woodstream Corp. v. Herter's, Inc.*, 446 F.2d 1143, 1150 (8th Cir. 1971).

(1) SCOPE OF PATENT CLAIMS

The 503 patent is entitled "transmission system". Clark contends that the District Court misconstrued the scope of the claims of the 503 patent by limiting them to a transmission system only and ignoring their integral relationship to a vehicle. A mere reading of the District Court's construction of the scope of the 503 patent claims belies this contention.

> The 503 patent contains four independent claims. Each claim is specifically directed to a particular cam actuated clutch drive mechanism for a self propelled vehicle having independently rotatable propulsion wheels which may be independently actuated by the aforesaid drive mechanism for driving the vehicle forward and backward, and for steering it.

Clark Equipment Co. v. Keller, Nos. 4875 and 4839, slip op. at 11 (D.N.D. Sept. 23, 1976). The District Court, in delineating the scope of the claims of the 503 patent, explicitly recognized that the basic purpose of the cam-actuated clutch transmission system was the steering and driving of a vehicle. Thus, the claims of the 503 patent were in fact construed just as appellant Clark argues they should have been, and Clark's contention requires no further consideration.

(2) EXCLUSION OF VELO LOADER FROM PRIOR ART

In order to make a determination of obviousness under 35 U.S.C. § 103, there must be a consideration of the differences between the invention and the prior art. Clark contends that the District Court erroneously excluded the Velo loader from the

prior art and, therefore, made an incorrect obviousness analysis on the 503 patent. The basis of Clark's contention is the premise that the Velo loader was prior art under § 103 because it was in public use or on sale prior to December 1, 1957, the statutory bar date under § 102 for the 503 patent.[6] The trial court held that the Velo loader was neither on sale nor in public use prior to December 1, 1957, and that its use prior to that date was experimental.[7] Upon a thorough review of the record, we are convinced that the trial court applied appropriate legal principles to reach these conclusions, and that they are based upon correct findings of fact.

Moreover, even if the trial court erred in determining that the Velo loader was not prior art, this error leaves its obviousness analysis unvitiated, for despite its finding that the Velo loader was experimental, the trial court went on to assume *arguendo* that the Velo loader was prior art and to analyze the obviousness of the 503 patent from that standpoint. The belt-driven Velo loader, which was not disclosed as prior art to the Patent Office, did not contain the cam-actuated clutch mechanism on which all four of the claims of the 503 patent were allowed. The trial court found:

---

6 On appeal, Clark has specifically waived the argument that this purported public use or on-sale activity rendered the 503 patent invalid under § 102(b); it argues only that these activities caused the Velo loader to be prior art under § 103. The anomaly of Clark's position is obvious: it relies on § 102(b) for a definition of prior art applicable to § 103, but chooses not to invoke the actual bar of § 102(b) itself. We can find no logical or legal explanation for this peculiar argument, and our disposition of this contention makes speculation on this point unnecessary.

7 In light of these clearly stated conclusions, we consider somewhat less than candid Clark's intimations in its briefs that the trial court found the Velo loader to have been on sale or in public use prior to the statutory bar date.

> Even if the original Velo loader as it existed prior to the critical date of December 1, 1957, is considered prior art to the 503 patent as having been in public use or on sale for more than one year before the 503 application was filed, this loader is no better prior art than the Loyd patent cited and relied upon by the Examiner, with respect to the particular clutch drive arrangement for a vehicle in combination with the cam actuation mechanism on which all four claims of the 503 patent were allowed. There are more of the elements in Loyd in the combination set forth in the claims of the 503 patent * * * than there are in the Keller Velo loader * * *.

Clark Equipment Co. v. Keller, *supra* at 19. Clark does not challenge the correctness of this finding;[8] nor does our independent review of the record reveal any reason to believe that it is incorrect.

(3) EXCLUSION OF WHITE PATENT FROM PRIOR ART

The White patent, which was not cited by the Patent Office, describes a windrower with a "steering structure for farm implements and the like." At trial and on appeal, Clark has intimated that this was the machine mentioned by Eddie Velo to the Kellers in the summer of 1956. On this basis, Clark contends that the White patent was prior art for the 503 patent and that the trial court erred in refusing to consider the White patent as prior art in its analysis of the obviousness of the 503 patent.

This contention is unconvincing for several reasons. First, we note that its basis, the testimony of Eddie Velo, is equivocal, for Velo could not testify with certainty that the windrower he mentioned to the Kellers was the machine described by the White patent. Even if we assume an identity between the White

---

8 Indeed, Clark does not even acknowledge the existence of this finding, which directly contradicts its contention that the trial court erred by failing to consider the Velo loader as prior art for the 503 patent.

patent and the windrower with which Velo was acquainted, however, we can perceive no error in the trial court's exclusion of the White patent from the prior art or, indeed, a basis for any other disposition of this issue. It appears that Clark did not choose to argue to the trial court that the White patent was prior art for the 503 patent. No evidence whatsoever was submitted by Clark at trial to show how the White patent, alone or in combination with any other patents, might be relied upon as prior art.

The District Court held that the Velo loader did not incorporate the claimed features of the 503 patent and was no better prior art than the Loyd patent cited and relied on by the Patent Examiner. It concluded that the relevancy of the White patent, which was at best a possible forerunner of the Velo loader, was limited, because the White patent was more significant to the belt drive of the original Velo loader than to the cam-actuated clutch drive of the 503 patent. We can find no error in the trial court's disposition of this issue.

(4) DIFFERENCES BETWEEN PRIOR ART AND CLAIMS OF THE 503 PATENT

Graham v. John Deere Co., 383 U.S. 1 (1966), requires that in making an obviousness analysis under § 103, the trial court determine the scope and content of the prior art, ascertain the differences between the prior art and the claims at issue and resolve the level of ordinary skill in the pertinent art. On appeal Clark alleges, in wholly conclusory fashion, that the trial court failed to ascertain the differences between the prior art and the claims of the 503 patent. This contention flies in the face of the trial court's careful examination of the claims of the 503 patent vis-a-vis the Schreck, Hellwarth and Loyd patents, which were the primary prior art patents relied on by the Patent Office, and the Velo loader, which was assumed to be applicable prior art for the purposes of an obviousness analysis. Based on this exam-

ination,[9] the trial court concluded:

> Assuming arguendo that the Velo loader is prior art, the deficiencies in that loader were easily recognized by both the Kellers and Velo. The most significant problem involved the heating, and subsequent expanding and slippage of the belts which resulted in the loss of driving and steering control. Installation of clutches was a solution, but there existed a gap in the teaching of the prior art — Hellwarth and Schreck — as to how to install clutches in such a way to be able to actuate them to maintain steering and forward and reverse control in a smooth and effective manner from the operator's compartment. The Kellers conceived a new clutch drive mechanism which proved to be highly effective and commercially successful. The solution by the Kellers was not readily obvious to one having ordinary skill in the pertinent art.

Clark Equipment Co. v. Keller, *supra*, slip op. at 28. We believe that the trial court complied with the requirements of *Graham v. John Deere Co.*, *supra*, by ascertaining the differences between the prior art and the claims of the 503 patent.

---

9 We consider that a repetition of the detailed findings underlying the differences ascertained by the district judge would serve no useful purpose here. In order, however, to give some indication of the careful and painstaking character of his analysis of the prior art, we will set forth a mere part of his findings on the Schreck patent. The District Court found, *inter alia*, that the Schreck patent disclosed "a self-propelled dolly which is controlled by an operator walking in front of the dolly. As disclosed by the drawings of the Schreck patent, steering and driving control is achieved through a draft tongue 6 having a rotatable gripping handle 61. A linkage bar 63 connected to handle 61 serves to move a link bar for actuation of a pair of clutch units * * * through crank arms * * * connected to the opposite ends of link 51." *Clark Equipment Co. v. Keller*, *supra*, slip op. at 17. We note that the findings which we have just cited represent a mere fraction of the District Court's exhaustive analysis of the prior art.

(5) SYNERGISTIC EFFECT OF CLAIMED TRANSMISSION SYSTEM

Clark argues that because the 503 patent is simply a combination of old elements, the trial court had an obligation to determine whether this combination acted to produce a synergistic or unexpected effect. Clark's allegation of error is based upon two premises, *viz* that a synergism analysis was required and that the District Court failed to meet this requirement. Because we find that the District Court did in fact give adequate consideration to the effect of the combination of elements in the 503 patent, we need not address the question of whether or not a synergism analysis was mandatory on the facts here. In passing, we do note, however, major differences between the basicness and simplicity of the old elements combined in the cases cited as controlling by Clark and the more complex elements of the 503 patent.[10] Moreover, it appears that hindsight alone persuaded Clark of the necessity for a synergism analysis, for Clark first made mention of this issue only in a post-trial reply brief, after failing to raise any synergism claim at or before trial.

The District Court's memorandum opinion does not contain an explicit analysis of synergism. In light of Clark's failure to raise a synergism argument prior to or during trial, we find this lack of explicit reference by the District Court unsurprising. In the patent law context, "synergism" has no talismanic power; synergism is merely one indication of nonobviousness. What is required, when a synergism analysis is appropriate, is simply a

---

10 *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273 (1976), involved an invention for the cleaning of dairy barns by means of flushing water down an inclined surface. In *Anderson's-Black Rock, Inc. v. Pavement Salvage Co., Inc.*, 396 U.S. 57 (1969), the invention consisted of hanging a radiant burner on the side of a paving machine. The invention involved in *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147 (1950), was nothing more than a U-shaped frame capable of sliding items along a counter top.

determination that the combination of elements in a patent produces "an effect greater than the sum of the several effects taken separately." *Anderson's-Black Rock, Inc., v. Pavement Salvage Co.*, 396 U.S. 57, 61 (1969). A careful reading of the District Court's opinion reveals that determinations of the novelty and unexpectedness of the combinative effect of the elements of the 503 patent underlie the District Court's entire analysis of obviousness under § 103. Form would triumph over substance were we to hold this analysis inadequate for lack of specific reference to synergism, particularly in view of Clark's failure to place the issue of synergistic effect into issue prior to or during trial.

(6) OBVIOUSNESS OF THE 503 PATENT

Nonobviousness is one condition of patent validity; the subject matter sought to be patented must not be obvious to a person having ordinary skill in the pertinent art. 35 U.S.C. § 103. While the question of obviousness vel non is, like the ultimate question of patent validity, a matter of law rather than fact, *Flour City Architectural Metals v. Alpana Aluminum Products, Inc.*, 454 F.2d 98, 106 (8th Cir. 1972), the obviousness condition imposed by § 103 is one which "lends itself to several basic factual inquiries." *Graham v. John Deere Co.*, *supra* at 17. The basic factual inquiries required under § 103 include a determination of the scope and content of the prior art, an ascertainment of the differences between the prior art and the claims at issue and a resolution of the level of ordinary skill in the pertinent art. *Graham v. John Deere Co.*, *supra* at 17. The District Court made the factual findings required by *Graham v. John Deere Co.*, and nothing Clark has urged on appeal convinces us that these findings are incorrect or lack support in the record.

The court held that the 503 patent met the nonobviousness requirement of § 103. Clark raises two primary challenges to

this conclusion of nonobviousness: first, that the 503 patent constitutes only an obvious improvement over the Velo loader combined with the Schreck and Hellwarth patents and, secondly, that the 503 patent constitutes only an obvious improvement over the White patent combined with the Schreck and Hellwarth patents. We conclude that the District Court was correct in its determination of the relevant prior art and in its rejection of Clark's contentions that the 503 patent was obvious in light of the original Velo loader taken in combination with the Loyd, Schreck, Hellwarth and White patents.

Assuming *arguendo* that the Velo loader was prior art, the District Court found that it did not contain the claims unique to the 503 patent and that it was no better prior art than the Loyd patent cited and relied upon by the Patent Examiner. The court also found that the White patent was more relevant as prior art to the belt-driven Velo loader than to the 503 patent and that the most pertinent prior art consisted of the Schreck and Hellwarth patents, which were cited, considered and rejected by the Patent Office. On this basis, the court concluded that Clark had failed to prove by substantial evidence how the prior art could be combined to meet the claimed structure of the 503 patent without hindsight.[11] We have previously rejected Clark's piecemeal attacks made on the basis of the trial court's obviousness determination. A careful review of the record convinces us that the District Court's conclusion that the 503 patent constitutes more than a merely obvious improvement over the relevant prior art is entirely correct.

---

11 A patent which has survived the scrutiny of the Patent Office is presumed to be valid, and one attacking validity on the basis of obviousness carries the burden of proof on this issue. *Woodstream Corp. v. Herter's, Inc.*, 446 F.2d 1143, 1149 (8th Cir. 1971).

(7) CANDOR TO THE PATENT OFFICE

Clark contends that the Kellers' failure to disclose the Velo loader as prior art to the Patent Office constituted a lack of candor that necessitates invalidation of the 503 patent. A patent applicant has an uncompromising duty toward the Patent Office to disclose all pertinent facts. However, a party seeking to establish fraud on the Patent Office because of a failure of full disclosure bears a heavy burden of persuasion: fraud on the Patent Office must be proved by clear, convincing and substantial evidence. *Norton v. Curtiss*, 433 F.2d 779, 797 (C.C.P.A. 1970).

The trial court rejected Clark's contention that the Kellers' nondisclosure of the Velo loader to the Patent Office constituted a breach of the duty of full disclosure. The court held that because there is no duty on a patent applicant to disclose prior use where there is a bona fide basis for believing the use was experimental, the Kellers had no duty to disclose the experimental Velo loader. Moreover, even assuming the Velo loader to be prior art, the court had previously found that it was nonanticipatory. Thus, the Velo loader was of such a nature that even if it had been disclosed to the Patent Office, it would not have had an impact on the issuance of the patent. *Tate Engineering, Inc. v. United States*, 477 F.2d 1336, 1345 (Ct. Cl. 1973). Accordingly, nondisclosure of the Velo loader did not constitute a breach of the duty of disclosure.

We have previously expressed our agreement with the trial court's findings that the Velo loader was experimental or, if considered prior art, was nonanticipatory of the 503 patent. These findings support the conclusion that the Kellers breached no duty of disclosure to the Patent Office. At trial, Clark failed to prove a breach of the duty of uncompromising disclosure to the Patent Office; on appeal, Clark has failed to demonstrate that the trial court erred in rejecting its unproved allegation of fraud.

117 PATENT

In May 1959, the Kellers and Melroe Manufacturing Company (Melroe) entered into an agreement whereby Melroe acquired an exclusive license under the 503 patent. In 1959 and 1960, Melroe manufactured and sold several loader models, the M-60, M-200 and M-400, all of which were equipped with the transmission drive system covered by the 503 patent.[12] These loaders did not prove to be especially profitable, and Melroe contemplated leaving the loader market. Louis Keller insisted that Melroe try to experiment with new loaders and, due at least partially to his insistence, Melroe decided to experiment rather than abandon the loader field. During the course of this experimentation in 1961, four prototypical preproduction loaders, designated M-440's, were built and the machine incorporating the elements of the 117 patent was developed. Because the 18 claims of the 117 patent, entitled "tractor vehicle and drive therefor", were reduced to practice during the development of the four M-440 prototypes, the individual histories of these machines bear consideration. Application for the 117 patent was filed on October 23, 1962, thus making October 23, 1961, the critical statutory bar date. A mechanical patent of 17 years' duration was granted to Louis Keller and Clifford Melroe on January 15, 1966.

The first preproduction machine, known as the Clyde Olson loader, was finished no later than the end of February 1961. Although it differed somewhat from earlier models, it was equipped with slide cam type clutch actuators identical to those employed in its predecessors. The Clyde Olson loader, which contained few, if any, elements of the 18 claims of the 117

---

12 The patent claims of the 503 patent were originally applied to a three-wheel vehicle with two independently rotatable forward driving wheels and a third free-castering rear wheel. By December 1960, the M-200 loader had been modified by the addition of a rear axle and two rear drive wheels, thus producing a four-wheel power driven skid steer loader.

patent, was never put into production.

Between the date of completion of the Clyde Olson machine and May 1961, a second prototype was constructed. This loader, known as the Gravel Pit loader, was tested extensively by Louis Keller and employees of Melroe in a gravel pit near Gwinner, North Dakota, as well as at the home of Cyril Keller in Rothsay, Minnesota. The Gravel Pit loader differed from the Clyde Olson machine in several major aspects, but not in clutch design. It contained cam type clutch actuators and did not embody all of the elements of the 117 patent.

A third prototype was completed sometime after July 4, 1961, and probably before August 1, 1961. This prototype contained improvements on some of the weaknesses revealed during the gravel pit testing of the third prototype. This testing had made it clear to Louis Keller that there were serious limitations to the tapered clutch design. In particular, the slide cam actuators tended to stick, which would cause the machine to cant or jerk unexpectedly, in a manner dangerous to the operator. Furthermore, the clutches would oil can[13] and the side plates bow, causing the clutches to slip. Nevertheless, the third prototype retained the cam type clutch actuators characteristic of its predecessors and, thus, did not reduce to practice the essential elements of the 18 claims of the 117 patent.

Louis Keller and Clifford Melroe subsequently conceived of and developed a threaded rotary actuator clutch, designed to avoid the aforesaid problems experienced with the slide cam type clutch. This threaded rotary actuator clutch was placed into the fourth prototype, a white loader with flat clutch plates known as the Cy Keller demo. Because of the flat clutch plates, there was difficulty in obtaining good clutch power transmission. The clutches tended to slip and could not be solidly

13 Oil canning occurs when pressure applied to a clutch plate causes flexion similar to that occasioned by the application of pressure to the center of the bottom of a round oil can.

engaged. Bench tests revealed that these problems were caused by the oil canning of the flat clutch plates. A new dome-shaped clutch plate was subsequently designed to avoid the oil canning problem. To provide for lubrication of the clutch linings, the design was also changed to provide oil pickup slots on the input clutch, intended to pick up oil thrown about inside the gear case by the chains.

After a period of testing, the decision was made to produce a new loader line, which was given the same M-440 designation that had been used for its prototypes. The M-440, which was to be white, a color considered appealing to the fertilizer industry, was equipped with a threaded rotary actuator clutch design. Production on the M-440, for which the trade name "Bobcat" was adopted, began in December 1961. The fourth prototype was built to check out the final production tooling for the M-440. It was the first machine to incorporate all of the elements of the threaded clutch actuator eventually put into the M-440. It also represented the first embodiment of all of the elements of the 18 claims of the 117 patent and, accordingly, the date of its construction is crucial. Unfortunately, the large amount of evidence submitted to date the construction of the fourth prototype is contradictory. After carefully analyzing all of the evidence on this point, the trial court found that the most credible evidence established that the date of construction had been near the end of the third quarter of 1961. The critical statutory bar date under 35 U.S.C. §102(b) is October 23, 1961.

Melroe engaged in commercial promotion of the M-440 before actual production of the new loader line began,[14] and in

14 There was conflicting testimony as to whether a white Melroe loader was exhibited at the Minnesota State Fair between August 26 and September 4, 1961. The trial judge deemed this evidence inconclusive and insufficient to support a finding that a white Melroe loader was on display at the Fair. He concluded that "Melroe intended to display a 440 loader at the Fair, but for some reason did not." *(Continued)*

some instances negotiations for sales also preceded production. In retrospect, the rapidity with which the M-440 began to sell may be viewed as an early and accurate indicator of the remarkable commercial success which this loader line has enjoyed. On the other hand, however, the early fruition of the M-440 sales campaign has redounded to the detriment of the holders of the 117 patent. The M-440 loader was offered for sale to both Farmers Union Central Exchange and Midland Cooperatives prior to October 23, 1961, and orders for future delivery were taken from those two companies prior to October 23, 1961. On this basis, that a machine incorporating the elements of the 117 patent had been on sale prior to the statutory bar date of § 102(b), the District Court held the 117 patent invalid. This invalidity under § 102(b) was the sole ground for the holding that the 117 patent was invalid; all other alleged bases for invalidity were considered and rejected by the District Court.

The District Court's ruling that the 117 patent was invalid under § 102(b) is challenged on appeal by the Kellers. Moreover, Clark, which acquired Melroe in 1969 and succeeded to its rights under the license agreement with the Kellers, attacks the District Court's rejection of the additional and alternative grounds of invalidity it has proposed. We will first address the contentions raised by the Kellers and then turn to the more numerous contentions of Clark.

---

14 *(Continued)*
There was also evidence showing that a news release advertising the M-440 Bobcat was distributed to a large number of trade publications and newspapers within a few days of the critical bar date of October 23, 1961. The news release was dated October 20, and a newspaper article published October 26 contained an almost verbatim recitation of the contents of the news release. There was, however, no direct evidence of the date on which the release was mailed.

(1) OFFER FOR SALE OF MACHINE EMBODYING ALL ELEMENTS OF THE 117 PATENT PRIOR TO THE STATUTORY BAR DATE

The Kellers present a tripartite challenge to the District Court's holding that a machine incorporating the elements of the 117 patent was on sale prior to October 23, 1961, the statutory bar date for that patent under 35 U.S.C. § 102(b). They argue that this conclusion is not supported by the evidence; that it is not supported by the trial court's findings; and that it is predicated upon a misconception and misapplication of *Dart Industries, Inc. v. E. I. Du Pont De Nemours & Co.*, 489 F.2d 1359 (7th Cir. 1973), *cert. denied*, 417 U.S. 933 (1974).

The parties introduced a vast amount of evidence on the 117 patent. The complex and often contradictory nature of this evidence is reflected in the trial court's lengthy memorandum opinion, which contains 151 findings of fact relative to the 117 patent alone. In contending that the trial court's holding, that there were invalidating sales of a machine incorporating the elements of the 117 patent, is not supported by the evidence, the Kellers point out that Clark bore the burden of proof, *Woodstream Corp. v. Herter's, Inc.*, 446 F.2d 1143, 1149 (8th Cir. 1971); they denigrate the adequacy of almost every piece of evidence relied upon by the District Court and point to evidence which, they contend, should have been relied upon instead.

We have reviewed the record in light of each of the Kellers' specific allegations of lack of evidentiary support. This review convinces us that the trial judge made an exhaustive analysis of the mountainous evidence submitted on the 117 patent and that his conclusion that a machine incorporating all the elements of the 117 patent was offered for sale prior to October 23, 1961, is adequately supported by the evidence. It would serve no useful purpose to recite and refute each separate allegation of evidentiary insufficiency urged by the Kellers; the

record, which we have read with care, contains more than adequate evidence to support the District Court's conclusion that "the 440 loader was offered for sale to Farmers Union Central Exchange and Midland Cooperatives prior to the October 23, 1961, § 102(b) statutory bar date, and that orders for future delivery were taken from those two companies prior to October 23, 1961." We deem it sufficient here simply to point out some of the more salient evidence supportive of this conclusion.

Melroe actively promoted the M-440 Bobcat not only prior to the commencement of production in December 1961, but at some time extremely near the statutory bar date. While this evidence alone is insufficient to establish that the M-440 was offered for sale prior to October 23, it is available to buttress the circumstantial evidence of sales activity found in the record. Insofar as the sales involving Farmers Union Central Exchange (Farmers Union) are concerned, a partial list of the evidence includes: Melroe's demonstration of a white loader to representatives of Farmers Union some time prior to October 4, 1961; a Melroe purchase order dated October 3, 1961, for three M-440 loaders with fertilizer buckets at $2,750 each; a Farmers Union purchase order dated October 4, 1961, for three M-440 loaders with fertilizer buckets at $2,750 each; a Melroe invoice with an acknowledgment date of October 4, 1961, for three M-440 loaders with fertilizer scoops at $2,750 each; and a bill of lading showing delivery of one 440 S.P. loader with fertilizer scoop to Farmers Union on January 4, 1962. The authenticity of these documents was established at trial. Moreover, the Kellers submitted no evidence rebutting or explaining these documents. Accordingly, the trial court chose to infer that the M-440 loader was offered for sale to Farmers Union prior to October 23, 1961. In our review of the record, we have examined the documentary and other evidence underlying this inference and are convinced that the trial court's inference and conclusion are fully supported by the record.

Insofar as the sales involving Midland Cooperatives are concerned, a partial list of the evidence contained in the record includes: a Melroe purchase order dated September 23, 1961, for nine M-440 loaders with fertilizer buckets for future delivery to different locations; and seven Melroe invoices, each of which bears an acknowledgment date of September 30, 1961, covering the sale of seven M-440 loaders with fertilizer scoops to Midland Cooperatives for delivery to different locations. The trial court considered this evidence in light of the testimony of former employees of Midland Cooperatives and Melroe on the procedures followed by Melroe in processing orders, and made the inference that the sales involved were processed prior to September 30, 1961. Our own review of these documents and

---

15 The Kellers argue that Clark was not entitled to inferences that offers of sale were made prior to the critical date. In its memorandum opinion, the trial court clearly explained that its inferences of sales activity were based upon specific sale documents. In an action tried without a jury, inferences drawn from documents or undisputed facts shall not be set aside unless they are clearly erroneous. *United States v. U.S. Gypsum Co.*, 333 U.S. 364, 394 (1948); *Birdwell v. Hazelwood School Dist.*, 491 F.2d 490, 494 (8th Cir. 1974). Moreover, when conflicting inferences may be drawn from the evidence, a reviewing court is not at liberty to disturb a reasonable inference made by the trial court unless it is definitely and firmly convinced that a mistake has been made. *A. L. B. Theatre Corp. v. Loew's Inc.*, 355 F.2d 495 (7th Cir. 1966). Finally, on appeal the evidence, including the inferences reasonably drawn therefrom, must be viewed in the light most favorable to the prevailing party. *Imperial Cas. & Indem. Co. v. Carolina Cas. Ins. Co.*, 402 F.2d 41, 44 (8th Cir. 1968). We have reviewed the trial court's inferences of sales activity prior to October 23, 1961; we find them to be reasonable and not clearly erroneous.

In challenging the inferences drawn by the trial court, the Kellers also argue that because of certain past behavior, Clark was not entitled to beneficial inferences from the evidence. After a careful analysis of Clark's past behavior, in particular, its failure to preserve evidence or records in its possession possibly relating to this issue, the District Court, "with some hesitation," gave Clark the benefit of inferences of sales activity. The Kellers have cited no authority which suggests that the District Court erred in deciding to draw inferences favorable to Clark. The record supports the inferences drawn by the District Court and we can find no error in the decision to draw inferences favorable to Clark.

the record as a whole convinces us that the trial court's inference was reasonable[15] and that its conclusion that the M-440 loader was offered for sale to Midland Cooperatives prior to October 23, 1961, is supported by the evidence.

The Kellers also argue that "the trial court's conclusion that a machine having all the patented features of the 117 patent was offered for sale prior to the critical date is not supported by the trial court's findings." In support of this contention, the Kellers refer specifically to only two of the trial court's 151 findings of fact on the 117 patent, which they characterize as inconclusive. Notably, they do not argue that these or any other findings of fact are clearly erroneous. We can find no merit in this contention. The trial judge's findings of fact support his conclusion and have not been shown to be clearly erroneous.

A patent is invalid under 35 U.S.C. § 102(b) if the subject matter of the invention has been on sale or in public use more than one year prior to the filing of the patent application. The District Court held that a machine embodying the elements of the 117 patent had been on sale prior to the statutory bar date. In discussing its conclusion that the § 102(b) bar applied, the District Court stated:

> It is not necessary that the "patented product" be on hand in commercial quantities for it to be "on sale" within the meaning of § 102(b). In fact, it is only necessary the invention be "essentially" completed at the time of the invalidating sale. Exact identity between the product sold and the product described in the patent application is not required. *Dart Industries, Inc. v. E. I. Du Pont De Nemours and Co.*, 489 F.2d 1359, 1364-65 (7th Cir. 1973), *cert. denied*, 417 U.S. 933 (1974).

Clark Equipment Co. v. Keller, supra, slip op. at 56. The Kellers contend that the District Court's conclusion is incorrect because it is based upon a misapplication of *Dart Industries, supra*. The crux of this contention appears to be that the District Court relied upon *Dart Industries* to avoid the identity requirement of

§ 102(b). We are unable to agree.

It is undisputed that the M-440 included all of the features of all of the claims of the 117 patent. The final prototype preceding production of the M-440 was the fourth prototype, which contained all of the elements of the threaded rotary clutch actuator concept. The trial court found that the fourth prototype was constructed during the third quarter of 1961, that is, prior to October 23. M-440 loaders were offered for sale to both Farmers Union and Midland Cooperatives prior to October 23. This evidence fully supports the District Court's conclusion that a machine embodying all of the elements of the 117 patent was on sale prior to the statutory bar date. We can find no legal error in this conclusion. The identity requirement of § 102(b) was met, and *Dart Industries*, which is merely interpretive of § 102(b), was not misapplied.

(2) STANDARD OF PROOF

Under 35 U.S.C. § 282, a patent which has survived the scrutiny of the Patent Office carries a presumption of validity, and a party objecting to the validity of a patent bears the burden of establishing invalidity. *Woodstream Corp. v. Herter's, Inc.*, 446 F.2d 1143, 1149 (8th Cir. 1971). The District Court required Clark to adduce substantial evidence of patent invalidity to rebut the presumption of validity. The Kellers contend that substantial evidence is an improper and overly lenient standard of proof. They argue that the District Court should have required Clark to establish patent invalidity by clear and convincing evidence and that Clark did not adduce clear and convincing evidence of invalidity and, therefore, failed to meet the appropriate standard of proof.

Although courts have differed over the precise quantum of proof necessary to overcome the presumption of patent validity, *Woodstream Corp. v. Herter's, Inc., supra* at 1149 n.4, there is general agreement that the burden is a heavy one. In

recent years, several circuits have defined the burden of establishing patent invalidity as one which must be satisfied by clear and convincing evidence.[16] This circuit, however, has defined the standard of proof in terms of substantial evidence. *Woodstream Corp. v. Herter's, Inc.*, *supra* at 1149 n.4; *L & A Products, Inc. v. Britt Tech Corp.*, 365 F.2d 83, 86 (8th Cir. 1966).

In requiring Clark to present substantial evidence in order to establish patent invalidity, the District Court was simply requiring the quantum of proof used in this circuit in patent cases. We cannot say that the District Court erred by imposing the standard of proof current in this circuit rather than substituting a standard used elsewhere. Applying the substantial evidence standard, the District Court deemed Clark's evidence of sales activities prior to the statutory bar date to be sufficient to establish the invalidity of the 117 patent under 35 U.S.C. § 102(b). As we have previously indicated, we find this conclusion to be amply supported both by the evidence and the trial court's findings. Moreover, it was based upon a correct interpretation of the controlling law, including the standard of proof.[17]

16 *See, e.g., Aluminum Co. of America v. Amerola Products Corp.*, 552 F.2d 1020, 1024 (3d Cir. 1977); *Chicago Rawhide Mfg. Co. v. Crane Packing Co.*, 523 F.2d 454, 458 (5th Cir. 1975), *cert. denied*, 423 U.S. 1091 (1976); *Minnesota Mining & Mfg. Co. v. Kent Indus., Inc.*, 409 F.2d 99, 100 (6th Cir. 1969).

17 Clear and convincing evidence and substantial evidence are not standards which lend themselves to precise definition or quantification and we will not attempt to identify and quantify any degree of variance which may distinguish them. We simply note that both are heavy burdens of proof and though there is a difference in the standards, we have no doubt that the proof which was considered adequate under the substantial evidence standard here would also suffice under the clear and convincing evidence test.

CLARK'S ALTERNATIVE CONTENTIONS ON THE INVALIDITY OF THE 117 PATENT

Clark convinced the District Court that the 117 patent was invalid under § 102(b) because of sales activity prior to October 23, 1961, the statutory bar date. Clark also challenged the validity of the 117 patent on the ground that it was obvious and did not, therefore, conform to the requirement of nonobviousness imposed by 35 U.S.C. § 103.[18] Under the guidelines of *Graham v. John Deere Co.*, *supra*, the District Court made an exhaustive analysis of the obviousness issue and ultimately concluded that the 18 claims of the 117 patent were nonobvious within the meaning of 35 U.S.C. § 103. Clark now challenges this determination and raises various miscellaneous claims of error. We will first address these miscellaneous contentions, which derive in large part from the trial court's § 102(b) analysis discussed above.

(1) DEMONSTRATION AT THE MINNESOTA STATE FAIR

There was conflicting testimony on the question of whether a white Melroe loader was demonstrated at the Minnesota State Fair between August 26 and September 4, 1961. The trial judge considered this evidence to be inconclusive and insufficient to support a finding that a Melroe loader was on display at the Fair. He found that Melroe had intended to display a loader at the Fair, but that it had not done so. Clark characterizes this finding as clearly erroneous and, in support of this characterization, cites the evidence favorable to a finding that a loader was on display.

18 Although the invalidity issue was decided in Clark's favor, the issue of nonobviousness remains live in regard to the Kellers' claim for negligence against Clark and its predecessor, Melroe, for failure to make a timely application for the 117 patent and in regard to Clark's third-party claim against the law firm of Williamson, Bains and Moore. These claims remain with the District Court for resolution.

Upon a review of the evidence submitted on this point, we are in full agreement with the trial judge's assessment that the record contained insufficient evidence to establish that a loader was displayed at the Fair. We consider his finding of non-display emminently correct. Moreover, even if we assume this finding to be erroneous, we are unable to discern how Clark could have been prejudiced thereby. The trial court ruled in favor of Clark by holding the 117 patent invalid under § 102(b) on the basis of sales activity prior to the statutory bar date. A finding that a Melroe loader was on display at the Fair would simply have provided cumulative evidence of this invalidating activity.

(2) EXCLUSION OF TWO MIDLAND COOPERATIVES PURCHASE ORDERS

One of the bases for the trial court's conclusion that the 117 patent was invalid under § 102(b) was the finding that the M-440 loaders had been offered for sale to Midland Cooperatives prior to the statutory bar date. Two documents offered by Clark to prove sales activity with Midland Cooperatives were excluded from evidence for lack of adequate foundation showing them to be business records prepared in the normal course of business. Clark contends that this exclusion was erroneous and that it reveals that the trial court imposed abnormally stringent evidentiary requirements upon Clark.

We can find no error in this exclusion. Moreover, we are unable to discern that this ruling had any prejudicial effect whatsoever upon Clark, which prevailed upon the very issue to which these excluded documents were directed. Finally, the record is devoid of support for the contention that in this or any other evidentiary ruling, improper evidentiary requirements were imposed upon either party.

(3) EXCLUSION OF INTERROGATORIES AND ANSWERS FROM UNIVERSAL LAWSUIT

Clark attempted to introduce into evidence an exhibit con-

taining discovery material from the lawsuit against Universal which had been settled by Clark's predecessor Melroe by way of a sublicense agreement with Universal. This exhibit consisted of interrogatories directed to representatives of Melroe and to the Kellers, and their answers thereto. In opposition to the introduction of this exhibit, the Kellers asserted that the Universal lawsuit had been controlled by Melroe's attorney; they testified that although they had signed the interrogatory answers under oath, they were never given or shown copies of the questions to which these answers pertained. The District Court excluded this exhibit from evidence, but permitted Clark to use the interrogatories and answers on cross-examination of the Kellers for impeachment purposes. Clark contends that this limitation was erroneous.

We need not decide whether this exclusion was erroneous, for we are convinced that if it was error, it was harmless. Clark engaged in extensive cross-examination of the Kellers, during which it was allowed to use the interrogatories and answers for impeachment. Moreover, Clark was successful in obtaining a ruling of invalidity on the 117 patent, to which this proffered exhibit apparently pertained. Under these circumstances, we do not believe that Clark has asserted, nor does our review of the record show, any prejudice flowing from the exclusion of this exhibit from the evidence.

(4) OBVIOUSNESS OF THE 117 PATENT

At trial, Clark challenged the 117 patent not only on the basis of invalidating activity under 35 U.S.C. § 102(b), but also on the basis of obviousness as that term is defined by 35 U.S.C. § 103. We have already expressed our agreement with the District Court's determination that the 117 patent was rendered invalid by sales activity prior to the statutory bar date imposed by 35 U.S.C. § 102(b). Clark argues that the District Court erred in not finding the 117 patent invalid on the additional ground of obviousness under § 103 and asks that we remedy

this purported error. Clark attacks the District Court's ruling that the 117 patent was nonobvious on three grounds. It alleges that the District Court failed to determine the scope and content of the prior art; that it failed to ascertain the differences between the prior art and the claims of the 117 patent; and that it erred in failing to find the subject matter of the 117 patent to be an obvious improvement over the prior art.

A perusal of these alleged errors could easily create the impression that the District Court chose not to consider the obviousness of the 117 patent because of its conclusion that this patent was invalid on other grounds. Nothing, however, could be farther from the truth. While Clark conceded that the 117 patent was nonobvious on the basis of the prior art cited to the Patent Office, it asserted that there was "pertinent prior non-cited art" upon which the 117 patent was merely an obvious improvement. The detailed consideration given by the District Court to this allegedly pertinent non-cited prior art, which included preproduction loaders used as demonstrators, the M-400 loader and a number of patents, is reflected in 23 findings of fact and a lengthy legal analysis. Adhering to the guidelines of *Graham v. John Deere Co.*, *supra*, the District Court determined the scope and content of the prior art asserted by Clark, ascertained the differences between this prior art and the claims of the 117 patent and determined the level of ordinary skill in the small loader art. The District Court found that Clark had failed to show how the non-cited art was more pertinent than the prior art cited by the Patent Office. In view of Clark's admission that, based solely on the cited art, the Patent Office was correct in allowing the 117 patent, the District Court concluded that Clark had failed to prove that the 117 patent was invalid under 35 U.S.C. § 103.

We have carefully considered each of Clark's attacks on the District Court's obviousness analysis of the 117 patent and find merit in none of them. The District Court made the findings of fact required by *Graham v. John Deere Co.*, *supra*, and nothing

Clark has urged on appeal convinces us that these finding are not correct and fully supported by the record. Moreover, the District Court's conclusion of nonobviousness reflects both a praiseworthy understanding and proper application of the controlling law.

(5) INDEFINITENESS OF 117 PATENT

Under 35 U.S.C. § 111, a patent application must include a specification of the patent. The requirements of this specification are set forth, as follows, in 35 U.S.C. § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains * * * to make and use the same * * *.

Clark contends that the omission from the specification for the 117 patent of any mention of the weight distribution of the wheels of the loader rendered the 117 patent application deficient under § 112. When the vehicle described by the 117 patent is fully loaded, 70% of the weight is on the two front wheels and 30% on the two rear wheels. The opposite is true in an unloaded condition: 70% of the weight is on the rear wheels and 30% on the front wheels.

There is some dispute as to who introduced the weight distribution issue at trial and what significance was attributed to it by the District Court.[19] In any event, the District Court's brief

---

19 Clark alleges that at trial, the Kellers "for the first time in the history of this patent, asserted that the key element in the 117 patent was the fact that there was a 70%-30% weight distribution on the wheels of the loader depending on whether the vehicle was fully loaded or unloaded." Clark also alleges that this weight distribution was labeled by the trial court as a critical element of the 117 patent. The Kellers respond that they have never asserted that the 70%-30% weight distribution is a key element and that Clark is attempting to mislead this court by stating that the trial court labeled the 70%-30% weight distribution as a critical element of the 117 patent.

discussion of the weight distribution of the patented loader occurred in its analysis of the obviousness of the 117 patent.[20] In response to Clark's allegation that the 117 patent was merely an obvious improvement over the M-400, the weight distribution of the patented loader was discussed. This aspect of the loader was hardly a surprise to Clark, which had touted the 70%-30% weight distribution in its own promotional literature. Nevertheless, Clark, which was also familiar with the patent application and thus aware that it did not mention the 70%-30% weight distribution, chose not to attack the 117 patent at trial on the basis of an inadequate specification under § 112. It now voices this challenge to the 117 patent for the first time on appeal. Under the circumstances, we are hardly predisposed to excuse Clark's failure to raise this contention at trial, especially in light of the fact that Clark has already succeeded in invalidating the 117 patent on other grounds. Nevertheless, because this contention lends itself to summary disposition, we will consider it now.

The District Court found that although the 70%-30% weight distribution is not expressly stated in the specification of the 117 patent, the features set forth in claims 10-15 and 18 do recite the structural features which provide this inherent condition. Thus, the weight distribution of the patented loader is inherent in the structural features recited in claims 10-15 and 18. A patent specification must be expressed in terms that will enable a person skilled in the art to which it pertains to make or

20 In its obviousness analysis, the District Court found the 70%-30% weight distribution to be a functional advantage inherent in the structure defined in claims 10-15 and 18 of the 117 patent and absent in the M-400. The patent specification recites the structural features which provide this functional advantage and we do not consider that the patent application was defective under § 112 for failure to describe this inherent functional advantage. Under these circumstances, it was proper for the District Court to consider the weight distribution of the patented loader in determining the obviousness of the patent.

use the invention. Were a person skilled in the loader art to construct a loader as described in the specification of the 117 patent with materials normally used for such construction, so as to include the elements of claims 10-15 and 18, the resulting structure would possess the 70%-30% weight distribution. Thus, the specification for the 117 patent is not deficient under § 112.

254 PATENT

On July 25, 1962, Louis Keller, Cyril Keller and Clifford Melroe applied for a patent on "the ornamental design for a self-propelled loader." This patent, the 254 patent, was issued on May 21, 1963;[21] it is a design patent covering the machine mechanically patented in the 117 patent.[22] The District Court sustained the validity of the 254 patent.

On appeal, Clark has presented numerous arguments in favor of reversing the District Court's holding that the 254 patent is valid. Because we conclude that the 254 patent did not comport with the novelty requirement of 35 U.S.C. § 171, we believe that a recitation and discussion of Clark's remaining allegations of error would be superfluous. Suffice it to say that we have scrutinized each of these other allegations of error and find

21 The record is somewhat unclear as to the duration of this design patent. Counsel for Clark stated at oral argument that the 254 patent had been issued for a fourteen-year period. Based on that figure, the 254 patent would have expired on May 21, 1977.

22 The history of the development of the machine which underlies both the 117 mechanical patent and the 254 design patent has been set forth at length in our analysis of the 117 patent and will not be repeated here.

them to be without merit.[23]

35 U.S.C. § 171 provides that a person who invents any new, original and ornamental design for an article of manufacture may obtain a patent therefor, so long as the other conditions and requirements of Title 35 have been met. It follows, under an integration of the various requirements for patentability set forth in Title 35, that in order to be valid, a design patent must be new, original, ornamental, nonobvious and the result of invention. In determining the validity of a design patent, it is the appearance of the article taken as a whole which must meet the statutory requirements, for "the thing invented or produced, for which a patent is given, is that which gives a peculiar or distinctive appearance to the manufacture, or article to which it may be applied * * *." *Gorham Co. v. White*, 81 U.S. (14 Wall.) 511, 525 (1871). *Schnadig Corp. v. Gaines Manufacturing Co., Inc.*, 494 F.2d 383, 389 (6th Cir. 1974); *Hadco Products, Inc. v. Walter Kidde & Co.*, 462 F.2d 1265, 1269 (3d Cir.), *cert. denied*, 409 U.S. 1023 (1972).

The tests by which the appearance of a design patent must be judged vary according to the particular statutory requirement for patentability which is at issue. The obviousness of a design patent is determined by an analysis under the general require-

23 We note that our determination that the 254 patent is not novel, when considered in light of the M-400 loader, does not vitiate the trial court's conclusion that the Kellers acted in good faith in the prosecution of the 254 design patent. Even if the M-400 is assumed to be better prior art than the 506 patent, which was considered by the Patent Office, we do not believe that Clark has shown that the Kellers' nondisclosure of the M-400 constituted an act of wilful bad faith manifesting an intent to mislead the Patent Office. The Kellers apparently considered the M-400 nothing more than a hybrid version of the earlier Melroe loaders covered by the 506 design patent, which was cited as prior art. Although we disagree with their appraisal of the M-400, the record does not provide support for the conclusion that their decision not to disclose the M-400 to the Patent Office was motivated by bad faith. Clark has not proved by clear, convincing and substantial evidence that the Kellers failed to act in good faith in the prosecution of the 254 patent.

ments of 35 U.S.C. § 103, tailored to fit the design situation: the differences between the design patent and the prior art must not be obvious to a designer with ordinary skill in the art. The novelty of a design patent, on the other hand, is tested by determining the impact of the design upon an ordinary observer. A design patent is novel when the "average observer takes the new design for a different, and not a modified already existing design." *Thabet Manufacturing Co. v. Kool Vent Metal Awning Corp.*, 226 F.2d 207, 212 (6th Cir. 1955). This is the prevailing and now well-settled test for the novelty of a design patent. *See, e.g., Schnadig Corp. v. Gaines Manufacturing Co., Inc., supra* at 389; *Rains v. Cascade Industries, Inc.*, 402 F.2d 241, 247 (3d Cir. 1968); *Hygienic Specialties Co. v. H. G. Salzman, Inc.*, 302 F.2d 614, 617 (2d Cir. 1962); *Application of Bartlett*, 300 F.2d 942, 943 (C.C.P.A. 1962).

At trial, Clark contended that the 254 design patent lacked novelty when viewed against the M-400 loader; it argued that the M-400 loader design was so similar in overall configuration to the design of the 254 patent that the ordinary observer could not distinguish them.[24] The District Court made the finding that there was no substantial evidence that an ordinary observer could not readily distinguish between the M-400 and the subsequent Bobcat loader covered by the 254 patent. Clark's novelty challenge to the 254 patent was rejected in the following terse conclusion:

> The test of the "ordinary observer" may be relevant to determine novelty with respect to design; however, there is no substantial evidence in this record that ordinary observers could not readily distinguish between the M-400 and the sub-

24 The sole prior art considered by the Patent Office was the 506 design patent, a patent on the machine mechanically patented by the 503 patent. While the District Court held that the M-400 was no better prior art for the 254 design patent than was the cited 506 patent, it nevertheless proceeded to consider the validity of the 254 patent from the viewpoint that the M-400 was prior art. We will follow the same analytic approach.

sequent BOBCAT loader covered by the 254 patent. The Court refers specifically to the sparse testimony of witnesses Steenhoven and Van Winkle.

Clark Equipment Co. v. Keller, *supra*, slip op. at 79.

Although various pictures and drawings of the M-400 loader and Bobcat loader covered by the 254 patent were introduced at trial, there was little testimony adduced that could be deemed applicable to the issue of the impact of the appearances of these loaders on the ordinary observer.[25] While we agree with the District Court that the testimony on the issue of the visual impact of these loaders was "sparse," we are unable to agree either with the finding that the record was devoid of substantial evidence probative of this point or the statement that the ordinary observer test "may" be relevant to a determination of novelty. The impact of the design upon an ordinary observer "may" not be relevant in determining novelty; as we have previously noted, it *is* the test for the novelty of a design patent. Moreover, when this test is applied to the record here, it compels the conclusion that the 254 patent is not novel.

In emphasizing the minimal quantity of testimony on this issue, the trial court clearly chose to base its conclusion of novelty upon the documentary evidence illustrating the designs of the M-400 and 254 patent. The documents depicting the M-400 and Bobcat loaders are as available to this court as they were to the trial court and it is our prerogative to interpret

25 The testimony of Steenhoven and Van Winkle related to a transaction between the two in which Steenhoven painted an M-400 loader white, the standard color for Bobcat loaders, and sold it to Van Winkle as a used Bobcat. While we would hesitate to consider this transaction definitive evidence that the ordinary observer could not distinguish the M-400 from the 254 design, it can certainly be viewed as providing support for such a conclusion. Moreover, the fact that testimony on this transaction is "sparse" and that the record is not replete with evidence of actual episodes of confusion on the part of ordinary observers hardly detracts from the cogency of the documentary evidence illustrating the similarity of the designs of the two loader models.

these exhibits ourselves. *American Infra-Red Radiant Co. v. Lambert Industries, Inc.*, 360 F.2d 977, 988 (8th Cir.) *cert. denied*, 385 U.S. 920 (1966). We have reviewed and compared this documentary evidence with care, and we are convinced that the trial court erred in finding that the differences between the M-400 and Bobcat loaders were sufficient to establish the novelty of the 254 patent. The differences between the two designs, cited by the District Court in support of its finding, involve structural details; when the overall visual impact, which is the appropriate reference for design patents, is considered, the striking similarity of the designs of the M-400 and 254 patent becomes clear. Both are compact four-wheel front-end loaders with boom arms pivoted on supports adjacent to the rear and extending down at a low angle in the front.

While "we do not say that six eyes are necessarily apt to reach a more accurate assessment than are two," *Frito-Lay, Inc. v. So Good Potato Chip Co.*, 540 F.2d 927, 931 (8th Cir. 1976), our observation of the documentary evidence depicting the designs of the M-400 loader and the 254 patent convinces us that an average observer would not view the design of the 254 patent as anything more than a modification of the M-400.

Accordingly, we conclude that the 254 patent did not meet the requirement of novelty posited by 35 U.S.C. § 171. This is our sole disagreement with the District Court's analysis of the 254 patent and it is on this basis alone that we hold the 254 patent invalid.

The judgment of the District Court on the 503 and 117 patents is affirmed; the judgment on the 254 patent is reversed.

A true copy.

Attest:

CLERK, U.S. COURT OF APPEALS, EIGHTH CIRCUIT.

BLANK

UNITED STATES
DISTRICT COURT, D. NORTH DAKOTA, S.E. DIV.

Clark Equipment Company

v.

Keller, et al.

Nos. 4875 and 4839

Decided Sept. 23, 1976

Benson, Chief Judge

Procedural History

A. Civil Action 4875.

This is a declaratory judgment action between Clark Equipment Company, Plaintiff, and Louis and Cyril Keller, Defendants, on an exclusive patent license contract entered into May 19, 1971, between Plaintiff as exclusive licensee and Louis and Cyril Keller, Defendants, as exclusive licensors. Exhibit 504 is a copy of the license agreement.

Involved are United States Patent Nos. 3,151,503 (hereinafter 503 patent), 3,231,117 (hereinafter 117 patent), and Design Patent 195,254 (hereinafter 254 patent).

The licensed patents relate to a self-propelled, 4 wheel drive skid steer loader vehicle manufactured by the Plaintiff and others. Plaintiff manufactures the vehicle at its Melroe Division, formerly the Melroe Company, Gwinner, North Dakota, and sells it under the trade name "Bobcat".

The action was filed originally in the United States District Court for the Western District of Michigan on October 10,

1972, seeking, in part, an adjudication as to the validity and enforceability of the licensed patents.

Upon motion of the Defendants, the action was transferred to the United States District Court for the District of North Dakota on August 27, 1973.

Defendants filed their answer and counterclaim September 19, 1973.

The counterclaim, in part, is for royalties allegedly due from Plaintiff under its license agreement with Defendants and its sublicense agreements with Owatonna Manufacturing Company and J. I. Case Company, the successor of the former Universal Manufacturing Company. Case and Owatonna each have nonexclusive license contracts with Clark Equipment Company.

The counterclaim further charged Plaintiff with negligence alleging that Clark, or its predecessor in interest, the Melroe Company, had been negligent in failing to file the patent application on the 117 patent within the one-year period after the invention had been in public use or on sale. (35 U.S.C. § 102(b).

The claim of negligence caused Plaintiff to file a third party complaint against the law firm of Williamson, Bains & Moore and George F. Williamson, Esq., as third party defendants, alleging that if there was negligence in filing the application for the 117 patent, the third party defendants, or predecessor partnerships or partners, who were representing the joint inventors, Louis J. Keller and Clifford E. Melroe, had a professional obligation to investigate the facts and see that the application was filed on time. It is alleged that should the 117 patent be found invalid under 35 U.S.C. § 102(b), the third party defendants would be liable to the Plaintiff as successor of the Melroe interest.

On April 29, 1974, the Court bifurcated the portion of the counterclaim directed at Plaintiff for failure to file the 117 patent on time, and the third party action directed at

Williamson, Bains & Moore and George F. Williamson, Esq., pursuant to Rule 42(b). For reasons stated in the same order, the third party defendants' motion to dismiss the action as to George F. Williamson, individually, was granted.

B. Civil Action 4839.

On July 25, 1973, the Kellers filed a separate action in this Court against Clark Equipment Company setting forth the corresponding allegations in the answer and counterclaim of Civil Action 4875, and naming as additional defendant, Clark Equipment, A.G., a Swiss corporation.

The complaint alleged that Clark Equipment A.G. had a similar license agreement with Plaintiffs, Louis and Cyril Keller, dated May 19, 1971, under which Clark Equipment A.G. was an exclusive licensee under certain foreign patents corresponding to the licensed patents in the agreements with Clark Equipment Company, and had failed to account and pay for royalties allegedly due under this contract. (See Exhibit 505).

Civil Action 4875, was originally transferred from the Western District of Michigan to the southwestern division of the District of North Dakota and moved to the southeastern division on November 6, 1973. Civil Action 4839 was originally filed in the southeastern division.

Upon motion of the Kellers, the two actions were consolidated on December 21, 1973.

C. Consolidated Actions.

After filing of the complaint in Civil No. 4839, Clark Equipment A.G. moved for dismissal, alleging lack of in personam jurisdiction, absence of proper service of process and failure of proper jurisdictional amount. The motions were denied. Keller v. Clark Equipment Company, 367 F.Supp. 1350 (D. N.D. 1973). Clark Equipment A.G. continues to assert its

jurisdictional defenses by its answer.

On July 18, 1974, the Court ordered a separate trial on the issue of validity of the three patents.

D. Trial.

The trial on the severed issue of validity of the three patents commenced February 18, 1975. It ended May 21, 1975. The trial ran for all or part of thirty-three days between these dates.

Five hundred and sixty-four exhibits were introduced as evidence. The testimony of forty-six witnesses, either in court or by deposition was received in evidence.

The typewritten transcript comprises thirty volumes, totalling over 5,000 pages.

E. Jurisdiction.

The Court has jurisdiction in Civil Action 4875 under the Declaratory Judgment Act, 28 U.S.C. § 2201 and 2202; the amount in controversy exceeds the sum of Ten Thousand Dollars ($10,000.00) exclusive of interest and costs; is between citizens of different states, 28 U.S.C. § 1391(a) and § 1338, and venue lies in this judicial district pursuant to 28 U.S.C. § 1391(a).

In Civil Action 4839, the Court has jurisdiction over the subject matter under 28 U.S.C. § 1332(a), there being diversity of citizenship, the amount in controversy exceeds Ten Thousand Dollars ($10,000.00), and venue lies in this judicial district under 28 U.S.C. § 1391(c).

Related Litigation

The three patents in dispute in this litigation have been involved in previous litigation — the significance of which will

appear later in this Memorandum.

In the first case, Melroe Mfg. Co. and Louis J. Keller and Cyril N. Keller v. Universal Mfg. Co., et al, Civil No. 4070, United States District Court for the Eastern District of Virginia, Melroe and the Kellers sued Universal for infringement of the 503, 117 and 254 patents.

The Universal suit was settled out of court, and pursuant to a stipulation wherein the parties acknowledged the validity of the three patents in dispute, a Consent Decree and Judgment was entered.

By the same settlement, Universal took a license from Melroe under the 503, 117 and 254 patents, providing for the payment of royalties to Melroe (Exhibits 464, 465 and 93).

Subsequently, J. I. Case Company purchased Universal Mfg. Co., and in doing so acquired the rights of Universal under the Melroe-Universal license agreement.

The second case, Owatonna Mfg. Co. Inc. v. Clark Equipment Co. and Cyril N. Keller, United States District Court, District of Minnesota, identified as 4-68 Civ. 163, was a Declaratory Judgment action by Owatonna Mfg. Co. (hereinafter "Owatonna") seeking to have the 503, 117 and 254 patents declared invalid. An aspect of that case is reported in Owatonna Mfg. Co. v. Melroe Co., 301 F.Supp. 1296, 163 USPQ 308 (D. Minn. 1969). Melroe was the original party defendant to that action, and in 1969, after Clark acquired Melroe, Clark was substituted as a party defendant. (Exhibit 546). This case resulted in an agreed dismissal without prejudice and a licensor-licensee arrangement.

Issues

[1] The primary issue of this litigation is the validity of the three patents. For a structure to be patentable, it must have three qualities — utility, novelty and non-obviousness. 35 U.S.C. § § 101, 102 and 103. The 1952 Patent Act added the

requirement of non-obviousness as a statutory requirement, although in effect the requirement arose in case law. Thus, patentability depends, in addition to novelty and utility, upon the "non-obvious" nature of the "subject matter sought to be patented" to a person having ordinary skill in the pertinent art and "at the time the invention was made". 35 U.S.C. § 103; Graham v. John Deere Co., 383 U.S. 1, 14, 148 USPQ 459, 465 (1966).

It cannot be seriously argued that the three patents in issue here do not satisfy the requirements of novelty and utility. The attack on validity of each of the three patents centers generally around two points:

1. Whether the device described in each of the patents was "in public use or on sale in this country, more than one year prior to the date of the application for the patent in the United States". 35 U.S.C. § 102(b).
2. Whether the "subject matter sought to be patented [in the case of each patent in question] and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains". 35 U.S.C. § 103.

Considerable legal discussion has surrounded the definition of "invention". To avoid confusion, the Court takes the position that its function in this litigation is not to determine whether an invention exists, an invention does exist; the issue here relates to patentability. In its discussion in this opinion, the Court will use the word "invention" in that light.

Burden of Proof

[2] By statute a patent "shall be presumed valid" as well as each claim of a patent whether in dependent or independent form, and the "burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting it." 35 U.S.C. § 282.

[3] The Eighth Circuit describes the quantum of proof required to overcome the presumption of patent validity as "substantial evidence". Woodstream Corporation v. Herters, Inc. 446 F. 2d 1143, 1149 n.4, 170 USPQ 380, 384 n.4 (8th Cir. 1971); L & A Products, Inc. v. Britt Tech Corporation, 365 F.2d 83, 86, 150 USPQ 770, 772, 773 (8th Cir. 1966). The Kellers urge this Court to impose upon Clark the burden of establishing its case "beyond a reasonable doubt." There is no legal basis for such a standard.

Estoppel Issue

On November 26, 1974, Louis J. Keller and Cyril N. Keller were given leave to amend their pleadings to allege a defense of estoppel with respect to the issues of patent validity. Specifically, the amended pleading raises the issue of whether Clark should be precluded by doctrines of judicial and equitable estoppel from challenging the validity of the three patents in this suit on the basis that the exact same prior art and alleged acts of public use and sale were asserted *against* Clark in the Owatonna suit and against Clark's predecessor-in-interest, Melroe, in the Universal suit.

[4] In the Universal and Owatonna cases, Clark's predecessor-in-interest, Melroe, defended the validity of the three patents in question here. Clark likewise defended the patents on the validity issue in the Owatonna case, and thereby presumably rebutted the same evidence which it now relies upon in its attempt to invalidate the patents. Whatever the position of the parties in those previous lawsuits, Lear v. Adkins, 395 U.S. 653, 162 USPQ 1 (1969), permits Clark, as a licensee, to now challenge the validity of the three licensed patents.

The Owatonna Manufacturing Company sued Melroe and

Cyril Keller on May 15, 1968, in the United States District Court, Fourth Division of Minnesota, seeking a declaratory judgment that the patents were invalid. One aspect of this case involved Louis Keller as a possible indispensable party. See Owatonna Mfg. Co. v. Melroe Co., 301 F.Supp. 1296, 163 USPQ 308 (D. Minn. 1969). Clark entered the proceedings in 1969 after acquiring Melroe. Subsequently, a license agreement with a Lear clause was entered into on December 16, 1970. The license agreement settled the lawsuit and the parties stipulated a dismissal without prejudice, terminating the litigation with each side merely withdrawing its claims and counterclaims. (Exhibits 508 and 547). The Kellers were represented in the litigation by the firm of Williamson, Palmatier & Bains, a predecessor of the law firm representing them in the litigation before this Court.

[5] Clark and Kellers entered into an agreement on May 19, 1971, which superseded the 1964 agreement the Kellers had with Melroe. The Clark-Keller agreement contains a Lear clause specifically permitting Clark to challenge the patents (Paragraph 15 of Exhibit 504). Attempts by Keller to now limit the application and scope of Lear v. Adkins are not supported by later case law. To prevent Clark from challenging the patent validity because it has previously entered into sub-license agreement with J. I. Case and Owatonna would be contradictory to the dictates of the Lear decision. Judicial estoppel is inappropriate.

Kellers assert a more serious charge that Clark has engaged in suspect and inequitable conduct by destroying documents after the litigation now before this Court commenced, which relate to the alleged invalidating acts of public use and sale relied upon by Clark in its attack on the patents under 35 U.S.C. § 102(b). Clark offered evidence to buttress its contention that any destruction was inadvertent and a part of the company program relating to document retention.

It seems a bit incredible that Clark's legal department which had been involved in the issue of the validity of these particular

patents since 1969, would not have had control over all the documents relating to it. The conduct becomes suspect because Clark defended the validity of the patents in the Owatonna lawsuit in which it had been involved for over a year and succeeded in getting the plaintiff in the case to take a license and dismiss its action.

Documentary evidence has been received in the case now before this Court which supports an inference that the device incorporating Patent 117, although not in production, was placed on sale prior to the critical statutory bar date. Kellers, not being privy to the Melroe or Clark documents, are unable to identify with the required degree of specificity any particular document which has been destroyed and may have been relevant and helpful to their case. An inference might arise that in the Owatonna suit Clark had available to it evidence to rebut the evidence it now relies on. For the Court to apply the doctrine of equitable estoppel, it would have to adopt the inference which, on the basis of the record, it is not willing to do because if such evidence had been available, presumably Kellers' attorneys in the Owatonna suit would have been aware of it.

Commercial Success

[6] Evidence of the commercial success of a patented device is of significance when considering whether or not the device is "obvious". Graham v. John Deere Company, 383 U.S. 1, 148 USPQ 459 (1965).

> "Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or non-obviousness, these inquiries may have relevancy." 383 U.S. at 17-18, 148 USPQ at 466-467.

[7] The amount of significance to attach to commercial

success in determining the issue of obviousness is debatable. Commercial success itself in a normal case is extremely difficult to measure. In the instant case, however, such is not the situation. Commercial success was not only shown, but it was the only point upon which both parties could agree. The significance, therefore, cannot be discounted.

The success aspect becomes particularly significant in considering the 117 patent. In addition to the recognition given the patent by Case (later Universal) and Owatonna, Clark itself became engrossed in a serious developmental program to create a skid steer loader. The need in the market in the 1960's was evident. The effort by Clark to create a competitive front end loader to the M-440 loader was a failure. Clark's own testing persuaded them that the Melroe product was unbeatable in substantially all phases of performance.

Clark presently applies the 503, 117 and 254 patent numbers to the current models of their Bobcat loader. (See Exhibits 438 and 439). Current models of the Clark Bobcat loaders are depicted in Exhibits 441 through 449. Exhibit 450 is a patent label which is attached to all the vehicles pictured in Exhibits 441 through 449, and that label lists the 503, 117 and 254 patents.

There are a number of exhibits which were introduced specifically to attest to commercial success of the Melroe loader. Among these are the following:

Exhibit 438 is a Clark sales brochure entitled, "World's Number 1 Skid Steer Loader" and shows various models of the Bobcat loader. The cover page of this booklet shows a photograph of the Keller shop in Rothsay, Minnesota, and pays tribute to the original Keller loader as the forerunner leading to the Bobcat loader models depicted in the brochure. On a page of this brochure describing and illustrating the M-610 Bobcat loader, there is a sketch of the M-610 variable speed chain drive system of the arrangement covered by the 503 and 117 patents.

Exhibit 439 is entitled, "371 Bobcat Loader" and shows

various attachments and applications for the Model 371 loader. That particular loader does employ the three patents contested in this case.

Exhibit 470 is a film made by the Kellers which depicts and describes the Melroe Bobcat in various operations. The narration accompanying this film relates to the maneuverability and the patented clutch drive system.

Exhibit 548 is a publication entitled, "Enginews" and contains a written article and photograph featuring the Melroe Bobcat and the growth of the Melroe Company.

Exhibits 543 and 544 are data sheets recording the growth and sales of the Clark-Melroe patented loader from 1959 through 1973. These documents show the sales of the patented loader increased from $25,000 in 1959 when Melroe first took on the Keller loader to $26,427,000 in 1973. On Exhibit 544, the percent market penetration by Clark-Melroe of the total loader market is indicated to have been as high as 51.2 percent in 1971. The large sales volume and market penetration of the Melroe Bobcat is to be attributed in a significant degree to the market protection provided by the licensed patents in suit and the utility, novelty and nonobviousness of the patented inventions incorporated in the loader.

503 Patent
The Evidence, Findings and Conclusions

1. U.S. Patent No. 3,151,503 was issued to Louis J. Keller and Cyril N. Keller, parties to these consolidated actions. on October 6, 1964. The 503 paten. is entitled "TRANSMISSION SYSTEM".

2. The application for the 503 patent was filed on December 1, 1958. A copy of the patent was received in evidence as Exhibit 53, and is attached in the appendix to this Memorandum. Exhibit 81 is a copy of the Patent Office file wrapper (record) of the 503 patent.

3. The 503 patent contains four independent claims. Each claim is specifically directed to a particular cam actuated clutch drive mechanism for a self propelled vehicle having independently rotatable propulsion wheels which may be independently actuated by the aforesaid drive mechanism for driving the vehicle forward and backward, and for steering it.

4. Louis Keller was self-employed in his own general repair and blacksmith shop in Rothsay, Minnesota, from the fall of 1947 through September, 1958. Cyril Keller joined his brother in the business in 1953.

5. The Kellers first came into contact with an Eddy Velo in 1954 in connection with the repair of some of Velo's automatic turkey feeders damaged in a wind storm.

6. Velo was then, and is now, a grain and turkey farmer living approximately seven miles northeast of Rothsay, Minnesota. In his turkey operation, Velo utilized two types of buildings: a quonset type barn which had a round roof, and two floors and a pole barn, a type of structure using poles for support. After a flock of turkeys was raised, it was necessary to clean the barns to remove the manure accumulations. Prior to 1957, the turkey barns were cleaned by hand. The manual cleaning was time consuming and inefficient.

7. The pole barns and two story quonset barns were constructed in a manner that prevented the use of mechanical loaders and other types of farm tractors in the cleaning process. The poles and poultry feeders placed in the barns caused a problem in maneuvering such machines. The second level of the quonset barns could not support the weight of a tractor, and even if they could, it would have been an almost insurmountable problem to get a tractor up to the second level.

8. Velo possessed mechancial skills and attempted to locate a suitable machine to handle the barn cleaning. On one occasion, he moved the axles of an Allis-Chalmers tractor closer together and shortened the body of the machine in an attempt to increase its maneuverability. All his efforts proved

unsatisfactory.

9. In the early summer of 1956, Velo discussed his barn cleaning problems with the Kellers. The Kellers were familiar with the Velo premises and with the conditions in which a machine would have to operate.

10. Velo described the type of machine he felt would be necessary, citing as an example the operation of an Owatonna Windrower he once owned which he believed had a separate reverse and forward belt drive for each side of the machine as well as a caster wheel arrangement in the rear.

11. During the summer of 1956, the Kellers contemplated the Velo barn cleaning problem.[1] At the end of the summer, Louis Keller presented a free hand sketch of a loader to Velo with a description of his ideas for a self propelled loader.

12. In late October of 1956, the Kellers began building a self propelled loader pursuant to an understanding with Velo that the Kellers would be paid their "out of pocket" costs and some of their labor.

13. Velo's suggestions for the machine were general and related to application and function rather than design. [His reference to the Owatonna Windrower was in terms of the machine's favorable aspects rather than its technical details.] His primary concerns were weight and maneuverability.

14. The Kellers took approximately three months to build their first self-propelled loader [hereinafter called the Velo loader]. During the months of November and December, 1956, and January, 1957, a substantial amount of the Keller's

---

1 In the words of Louis Keller:
"So we just started figuring and figuring and figuring, and didn't sketch these out. We didn't have a drafting board or anything. In fact we didn't even know how to run one. We took a piece of cardboard and freehand sketching it out and using a ruler. And we spent that summer on laying this thing out, how to put a, we knew all these posts and stuff in there and all the feeders that he said he used all kinds of different equipment to get in there, so we just started laying out and trying to get something that would work in there." Transcript May 1, 1975, Louis Keller, pg. 61-62.

shoptime was devoted to the loader project, time for which they were never fully compensated.

15. The loader was delivered to Velo in February of 1957.

16. Velo paid the Kellers $1,349.00 as compensation to the Kellers for parts, materials and some of the labor that went into building the loader. An entry made on Velo's charge account by the Kellers on February 4, 1957 (Plaintiff's Exhibit 54B), corresponds with a charge slip No. 68503 (Plaintiff's Exhibit 3). Payment by Velo of the $1,349.00 was made on March 7, 1957 (Plaintiff's Exhibit 54B).

17. The Kellers devised what they believed to be a workable design for a loader which they hoped would solve Velo's cleaning problems; however, they lacked the capital to build it. Velo did have the capital and assumed the risk of capital loss while the Kellers provided design and labor. Because of their elementary design methods, the Kellers invented as they built, depending on mental conceptualizations, rather than mechanical drawings. The Kellers could not and did not guarantee success, and Velo was willing to risk some costs involved.

18. Velo's barn cleaning problems and his willingness to risk capital provided the inspiration and the means for Kellers to devise and build a loader. Their testing grounds was the Velo farm.

19. Prior to delivery to Velo in February of 1957, the Kellers tested their loader within their shop.

20. The Velo-loader initially incorporated a rear mounted engine and a belt drive to the two forward driving wheels. The belt drive to the loader wheels was basically as depicted in Exhibit 99.[2]

---

2 Power was transmitted to each wheel by shifting an idler pulley (E) back and forth in an arcuate slot to bring a main drive belt (C) against one or the other of a pair of drive pulleys (F) and (D). These two drive pulleys (F) and (D) were mounted on separate shafts with each shaft having another pulley (L), (K) mounted thereon. A final drive belt (I) was wrapped over and under pulleys (L) and (K) to provide forward or reverse drive to each vehicle wheel. (See also Exhibits 44, 46, 47, 49, 51 and 52 which show the belt drive included in the Velo loader).

21. The overall construction of the Velo-loader is shown in photograph Exhibits 399 and 400.

22. Between February of 1957 and the summer of 1958, the operation of the machine brought out problems which caused Kellers to make various modifications and improvements in the Velo-loader. Velo was not charged for these modifications and improvements.

23. The most serious problem encountered with the Velo loader was in the belt drive. The drive belts on each side of the loader would stretch as friction induced heat built up as the idler lever was shifted back and forth. The shifting of the idler lever was necessary for steering and for driving the loader forward and reverse. As a result of the belts stretching, the loader would lose driving power in both forward and reverse. If only the belt on one side became stretched, the loader would simply swivel in a circle. The heating and stretching of the belts required frequent belt replacements.

24. The belt problems led Louis and Cyril Keller to develop a clutch system which would eliminate the belt drive that caused the problems. During February and March of 1958, they constructed a test plate resembling the side plates of the Velo loader. On that test plate, they began to develop the clutch assembly which finally became the transmission system covered by the 503 patent.

25. In May or June of 1958, Kellers took the test plate unit with the clutch drive on it to the Minneapolis patent attorneys, the firm of Williamson and Palmatier.

26. At the end of July or early August, 1958, the cam actuated clutch drive mechanism recited in each of the four claims of the 503 patent was installed in the Velo-loader.

27. With the installation of the cam actuated clutch drive mechanism in the Velo-loader, the following elements of the 503 patent, (identified by reference numerals on the drawings of the 503 patent), were incorporated into the Velo-loader for the first time.

(a) Slide bar 18 to control the operation of the clutches.

(b) Input and output plates 11,11' and 10,10' respectively of two pairs of clutches on each side of the loader.

(c) Cam elements 19 and 19' of the 503 patent, located on opposite ends of the slide bar 18 for engaging the clutches by pressing the two pairs of clutch plates together, through operation of the levers in the operating compartment.

(d) Cam followers 17 and 17' contacted by cam elements 19 and 19'.

28. In the course of installing the clutch drive and its actuating mechanism on the Velo-loader, various other modifications became necessary.

(a) The pulleys and sprockets labeled 1 and 2 on Exhibit 46 were taken off the loader, from each side plate assembly.

(b) The idle tightener or swing pulley labeled on Exhibit 46 as 3 was removed and a sprocket was installed with a chain (identified as 20 on the 503 patent drawings) to drive the input plates 10,10' of the clutches shown in Fig. 3 of the 503 patent.

(c) The pulley, labeled 4 on Exhibit 46, on the top jack shaft was removed.

(d) The pivot pins or shafts for the pulleys and sprockets 1 and 2 (see (a) above) were taken off and new pins or shafts for the clutches were installed at different locations from the original pulley pin locations. See Exhibit 61.

(e) The lever (identified as 7 on Exhibit 52) originally used to move the tightener or swing pulley in the arcuate slot (identified as 8 on Exhibit 61) was welded closed.

(f) The linkage from the main operator's control levers L (Exhibit 53, 503 patent) was changed to properly operate the slide bar actuator 18 (503 patent) for the clutches. The pivot point for the main control levers was raised (See 9 on Exhibit 56), and the linkage (10 on Exhibit 56) was extended into the framework to connect with slide bar (18).

29. The cam actuated clutch drive provided more positive,

responsive and reliable steering, starting and stopping control. Kellers made no charge to Velo for the cam actuated clutch improvement to the Velo-loader.

30. Kellers built no other loaders prior to December 1, 1957 (the critical date under 35 U.S.C. § 102(b) with respect to the 503 patent).

31. In January or February of 1958, Kellers built several more loaders having a belt drive of the type originaily incorporated in the Velo-loader. Pursuant to a written agreement for the sale of five loaders, three of these loaders were delivered to Jenoff, Inc. of Fergus Falls, Minnesota, in the spring of 1958. A retail purchase order was signed by Jenoff, Inc., and Cyril Keller on February 27, 1958.

32. The earliest indication of any relationship or contract between the Kellers or Jenoff relating to the loader sale was in some December 12, 1958 Jenoff corporate minutes.

33. There is no evidence that the Kellers were in contact with Jenoff concerning their loader prior to the § 102(b) critical date of December 1, 1957.

34. The loaders delivered to Jenoff, Inc., in the spring of 1958 did not have the patented cam actuated clutch drive assembly.

35. The Kellers' primary purpose in building the first loader was to overcome Velo's barn cleaning problems. Kellers could not guarantee the basic success of the loader, nor could they be sure the loader would be able to solve the maneuverability and weight problems Velo had been experiencing with other machines. Velo provided the money for the materials needed to construct the loader, and also provided the grounds upon which to test it. The relationship between the Kellers and Velo was one in which the Kellers were kept closely advised of the loader's performance and were allowed unlimited access to the machine, enabling them to repair, improve and observe it. There were occasions when it was necessary for the loader to be returned to the Keller shop.

36. During the period from February, 1957, to the time Kellers installed the cam actuated clutch drive, the Velo loader was in experimental use.

37. Although the testing arrangement was informal in contrast to a testing program that might have been conducted by a sophisticated machinery manufacturer such as Clark Equipment Company, it was experimental and entirely consistent with the nature of the dealings between the Kellers and Velo.

38. Each of the claims of the 503 patent was allowed on a specific combination of elements for transmitting power to vehicle drive wheels, including a cam actuated clutch drive mechanism for forward and reverse driving of propulsion wheels.

39. The Velo loader did not incorporate the cam actuating elements and clutches described in the 503 patent until after the December 1, 1957 critical date.

40. With respect to the cam actuated clutch drive features contained in all of the claims of the 503 patent, the patents to Schreck (Exhibit 85) and Hellwarth (Exhibit 86) are the most pertinent prior art. Both were among those considered by the Patent Examiner in the course of the prosecution of the application for the 503 patent and were discussed at Pages 16, 17, 24, 51, 64-67 of the file wrapper, Exhibit 81. Both were cited as references on the patent document, Exhibit 53.

41. In its Section 103 challenge to the validity of the 503 patent, Clark relied on the combination of the original Keller (Velo) loader as prior art along with the patents to Schreck (Ex. 85) and Hellwarth (Ex. 86).

42. The Schreck patent discloses a self-propelled dolly which is controlled by an operator walking in front of the dolly. As disclosed by the drawings of the Schreck patent, steering and driving control is achieved through a draft tongue 6 having a rotatable gripping handle 61. A linkage bar 63 connected to handle 61 serves to move a link bar 51 (Fig. 6) for actuation of

a pair of clutch units 21, 31 and 22 and 32 through crank arms 49, 50 connected to the opposite ends of link 51. The two clutch assembles are mounted on upper and lower shafts 16, 17. Shiftable collars 39, 46 on the clutch shafts serve to engage the clutches in response to axial displacement of those collars by thrust pins 58 as the collars are rotated simultaneously by link 51 and crank arms 49, 50. The single dolly support wheel 4 of Schreck is rotationally mounted for steering action by swinging movement of the draft tongue 6. Upward movement of draft tongue 6 stops the vehicle by urging brake shoe 68 against wheel 4. With the draft tongue 6 in an upward position, gripping handle 6 cannot be moved in such a way as to engage the clutches for forward movement of the dolly. Power is transmitted from a motor 12 through a chain 29 to the input sprockets 26, 27 on the clutch shafts 16, 17. A final drive chain 42 to the dolley wheel 4 has its inside face wrapped around clutch output sprocket 36 and its outside face wrapped around lower clutch output sprocket 37. Thus wheel 4 will be driven forwardly or rearwardly depending upon whether the upper or lower clutch assembly is engaged by hand rotation of handle 61.

43. The description of the cited Hellwarth patent on Page 110 of the file wrapper history of the 503 patent (Ex. 81) is reasonably accurate and is restated here as follows:

> "Hellwarth teaches a tractor transmission adapted for driving right and left hand traction wheels in opposite directions to produce abrupt steering or turning, plus a differential unit to allow for conventional steering by a suitable steering gear. Fig. 1 of Hellwarth shows a tractor transmission driven from power input shaft 31 which, in turn drives shaft 29 and gear 28 at one of two selectable speeds, through change-speed gears 32. Gear 28 drives gear 25 and shafts 17 through the differential mechanism 18, 19, 20. Through gears 16 and 7, power is transmitted to first clutch plates 8, both clutch plates on either side of the vehicle being driven in the same direction. Output shafts 3 and 4 are connected to second

clutch plates 10, said second clutch plates being adapted to be forced into engagement with first clutch plates 8, by means of wedges 12 and 13. When each of shafts 3 or 4 is drivingly connected to its respective clutch plate 8, gear 5 is driven. Both gears 5 on a single side of the vehicle rotate in the same direction, but since final drive gear 6 lies *between* the two gears 5, and is in mesh with both of them (see Fig. 4), each gear 5 will rotate gear 6 in an opposite direction. Therefore, driving through shaft 3 gives a forward drive to its respective traction wheel (final drive gear 6 is attached directly to the traction wheel on either side of the vehicle), while driving through shaft 4 imparts a reverse drive to the same traction wheel.

For normal driving and steering, the differential unit 18-14-20 is operative to allow one traction wheel to rotate slightly faster or slower than the other, when necessary, while the vehicle is steered by a 'suitable steering gear'. However, if an abrupt turn is desired, the differential mechanism is locked out and rendered inoperative as a differential drive by engaging clutches 21 (see Fig. 5). The traction wheels are driven in opposite directions by operation of levers 15 (Figs. 1 and 2) to set the clutches 8 so that the forward drive shaft 3 of one of the traction members is engaged, and the reverse driving shaft 4 of the other traction wheel is engaged. See page 2, lines 72-93 of Hellwarth for a description of this turning operation. Either of shafts 3 and 4 is engaged by movement of wedge 12, forward or backward, by means of lever 15, controlled by the operator of the tractor."

44. The cited Loyd patent (Ex. 84) discloses a self-propelled vehicle having independently rotatable propulsion wheels on each side. Referring to the drawings of the cited Loyd patent, a source of driving power 20 is connected through a belt drive 18 to a jackshaft 17 providing input power to separate transmission systems on opposite sides of the vehicle. Output shafts 13, 14 on opposite sides of the vehicle lead from the separate trans-

mission systems to the wheels. Each transmission system has a pair of clutches 24, 26 and 30, 26. A belt 27 connects one of the output plates 30 of each pair of clutches with the transmission wheel shafts 13, 14; and wheels 11 can be driven in a reverse direction by engaging the other output clutch plates 24 with input clutch plate 26. The transmission of driving power from output clutch plates 24 through pairs of gears 22, 21 causes output wheel shafts 13, 14 to rotate in the opposite direction from that provided by belts 27.

45. Even if the original Velo loader as it existed prior to the critical date of December 1, 1957, is considered prior art to the 503 patent as having been in public use or on sale for more than one year before the 503 application was filed, this loader is no better prior art than the Loyd patent (Ex. 84), cited and relied upon by the Examiner, with respect to the particular clutch drive arrangement for a vehicle in combination with the cam actuation mechanism on which all four claims of the 503 patent were allowed. There are more of the elements in Loyd in the combination set forth in the claims of the 503 patent, as set forth in preceding Finding No. 44, than there are in the Keller Velo loader depicted in Exhibits 51, 52 and 59.

46. The modified Velo loader drive mechanism as proposed by Clark's mechanical engineer expert, Butler, in composite drawing sketch Ex. 100 would not operate satisfactorily. Butler's proposed modification to the Velo loader as shown in Ex. 100 to arrive at the drive mechanism claimed in the 503 patent continues to use the vertical idler pulley actuating lever found on the Velo loader and identified by the numeral 7 on Ex. 52 and 100. Butler's sketch shows this lever 7 anchored at its bottom end by a pin to a forked end slide bar for actuating the clutches. The pivotally supported lever arm 7 would tend to rotate them through an arc at its bottom and when actuated by the control linkage shown in the Butler sketch of Ex. 100; and this would in turn raise the ends of the slide bar pinned to lever arm 7. The up and down movement of the slide bar, as opposed

to the required straight back and forth horizontal movement would place excessive stress on the connecting cam following collars engaged by the forked ends of the cam or slide to actuate the clutches. (Exhibits 52 and 100).

47. Butler's testimony with respect to the issue of obviousness of the claims of the 503 patent under 35 U.S.C. § 103 constituted a hindsight reconstruction of the claimed subject matter using the claims of the 503 patent as a guide. Exhibit 100 illustrates Butler's proposed modification of the original Velo loader drive to meet the claimed subject matter of the 503 patent. Butler acknowledged that his testimony concerning the alleged suggestion of the Hellwarth patent linkage mechanism for actuating clutches as called for in the claims of the 503 patent was based on his examination of the claims of the 503 patent. Butler was able to arrive at the overall combination of elements set forth in all of the claims of the 503 patent only by reliance on hindsight flowing from the 503 patent itself.

[8] 48. The level of ordinary skill in the art to which the subject matter of the 503 patent relates would be greater than that of an operator or a mechanic. He would be someone who has had some experience in machine design or the application of engineering principles, a person who has been exposed to different types of mechanical mechanisms, such as a graduate engineer or a person with experience gained in the field.

Conclusions of Law

The Court concludes on the basis of all the evidence, the Plaintiff, Clark Equipment Company, has failed to carry its burden of showing by substantial evidence that the Velo-loader was in public use and on sale within the meaning of § 102(b) prior to December 1, 1957.

The Court further concludes that in considering the most

pertinent prior art and the patented cam actuated clutch drive mechanism of the 503 patent, the subject matter of the 503 patent, taken as a whole, would not, at the time the invention was made, have been obvious, to a person having ordinary skill in the art to which the subject matter pertains.

503 Patent
Discussion of the Facts and Application of the Law

[9] Clark proceeds under both 35 U.S.C. § 102(b) and § 103 in its attack on the validity of the 503 patent, but in substance directs its arguments to the § 103 obviousness tests. It does, however, also argue its § 102(b) challenge. "Obviousness" and "prior art" are separate theories, each of which must be given separate consideration.

A. 35 U.S.C. § 102.

[10] On its contention that the 503 patent must fall under § 102(b), Clark argues the Kellers actually lost their patent rights when the Velo loader was transported to the Velo farm. However, the Velo loader did not incorporate the 503 transmission system until after the critical date of December 1, 1957. Clark correctly contends that exact identity between the device in public use or on sale and the claims in the patent is not necessary, but it appears to be the law that the invention must be "essentially completed at the time of the invalidating sale." Dart Industries, Inc. v. E. I. DuPont DeNemours and Co., 489 F.2d 1359, 1365, 170 USPQ 392, 396 (7th Cir. 1973).

The belt drive system of the original Velo loader was not the equivalent of the cam actuated clutch drive means of the 503 patent. The invention described in the 503 patent "*relates to systems for transmitting driving power* from a power unit to propulsion wheels, drive shafts and the like, and in particular to a transmission system for self propelled vehicles having

independently rotatable propulsion or drive wheels."

The Velo loader did not contain the essential structure of the claimed invention. The invention set out by the 503 patent was not reduced to practice in the Velo loader. There was no physical operable embodiment of the 503 patent in existence prior to the December 1, 1957 critical date. This was not a case where a claimed invention was in existence and needed but a few engineering improvements. The invention embodied in the 503 patent was not demonstrably operable. On December 1, 1957, the inventive process involved in the transmission system described in the 503 patent had not been finished, and for all practical purposes had not even been commenced.

If the construction of the Velo loader and its subsequent placement on the Velo farm was a § 102(b) "public use or sale", it was not a "public use or sale" of the drive mechanism on which the 503 patent issued. In its response brief, Clark contended "[T]he Velo loader was in all respects a reduction to practice of the real invention and accomplished the same purposes in substantially the same way as described and claimed in the 503 patent", and therefore must be considered "prior art" under § 103. Kellers argued the Velo loader, above all, was an experimental machine and under the experimental use exception to the public use and sale bar provisions of 35 U.S.C. § 102(b), it could not be considered "prior art" as to the 503 patent. See Elizabeth v. Pavement Co., 97 U.S. 126 (1878); Swenson v. Boos, 156 F.2d 338, 70 USPQ 287 (8th Cir. 1946); Simmons v. Hansen, 117 F.2d 49, 52, 48 USPQ 345, 348, 349 (8th Cir. 1941); Midland Flour Milling Co. v. Bobbitt, 70 F.2d 416, 21 USPQ 60 (8th Cir. 1934).

The Court, although concluding the original Velo loader to be experimental within the concept of the developed case law will, on the issue of obviousness, consider whether the Velo loader was "prior art" to the 503 patent.

Based on the evidence, the § 102(b) attack on the 503 patent fails. The sole issue is whether the 503 patent satisfied the § 103

"obviousness requirement". And the more pertinent inquiry relating to the Velo loader is whether it is "prior art" to the 503 patent.

B. The Test For Obviousness.

The statutory requirement of nonobviousness for patentability rests upon 35 U.S.C. § 103, enacted in 1952, which provides:

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

In Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1965), the Supreme Court enunciated the guidelines of inquiry into obviousness under § 103:

> "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy." 383 U.S. at 17-18, 148 USPQ at 466-467.

[11] The Supreme Court noted that while the ultimate question of patent validity is one of law, the determination of

obviousness lends itself to several basic factual inquiries as enumerated above. 383 U.S. at 17, 148 USPQ at 466. The Court also observed in Graham that the question of obviousness "is not a question upon which there is likely to be uniformity of thought in every given factual context." Id at 18. It advised using the same judicial approach as that employed in deciding questions of negligence and scienter. Id. The test for obviousness must be resolved upon a case by case analysis. Id; Woodstream Corp. v. Herter's, Inc., 446 F.2d 1143, 1150, 170 USPQ 380, 385 (8th Cir. 1971).

C. Obviousness of the 503 Patent.

Each of the claims of the 503 patent relates to a specific combination of elements for transmitting power to vehicle drive wheels, including a cam actuated clutch mechanism for forward and reverse driving of propulsion wheels on a vehicle as follows:

Application claims 11 and 12, which became 503 patent claims 1 and 2, were allowed as presented in an amendment to the Patent Office in Paper No. 4 on July 6, 1959. Patent claim 1 as presented at that time included the recitation of a movable shifting member (slide bar 18 in the 503 patent drawings) "having a camming surface opposed to and contiguous with adjacent pairs of said cam follower means, said camming surface including a pair of drive promoting cam portions and an idling portion and means for moving said member to selectably engage one of said drive promoting cam portions with one of said cam followers or with said idling portion to transmit forward or reverse driving power to said propulsion wheel or simultaneously disengage both clutches to permit idling of said wheels." Patent claim 2 as presented at the same time had a substantially similar recitation, but more specific, of an elongate, slidable shifting member having a pair of longitudinally spaced apart protuding cam portions contiguously opposed to cam follower means carried by clutches in

combination with a single operating member in the vehicle cab for reciprocating the slidable member across the cam followers to selectively engage one of the cam portions with one of the cam followers means to drivingly engage one of the clutches. (Ex. 81, File Wrapper of 503 patent, pages 18-20 and 24.)

Patent claims 3 and 4 of the 503 patent were allowed as presented in the form of application claims 22 and 23 in an amendment filed October 27, 1961, the allowance of these claims being indicated by the Patent Examiner in the subsequent Patent Office Action on Page 67 of the File Wrapper of the 503 patent, Ex. 81. These claims were drawn along the same general lines as previously allowed patent claims 1 and 2 (application claims 11, 12). The same basic cam actuated clutch mechanism was again recited in patent claims 3 and 4, this recitation included a movable shifting member with a pair of drive promoting cam portions and an idling portion and means for moving the shifting member to selectively engage one of the drive promoting cam portions with one of (a pair of) cam followers or with said idling portion to transmit forward or reverse driving power to a propulsion wheel or to simultaneously disengage both clutches to permit idling of the wheel. Patent claim 4 as submitted in the aforesaid amendment includes a very similar recitation of cam actuating means for the vehicle clutches, in slightly different form. (Ex. 81, File Wrapper of 503 patent, pages 54-58 and 64-67).

Clark contends the 503 patent is invalid under 35 U.S.C. § 103 as being obvious to one skilled in the art at the time of invention based on the original Velo loader taken in combination with the prior art patents cited by the United States Patent Office — Loyd (Ex. 84); Schreck (Ex. 85); and Hellwarth (Ex. 86); and the White patent (Ex. 75), which was not cited by the United States Patent Office.

[12] The principle attack against the 503 patent involves the Velo loader and the obviousness of its belt drive transmission. In its attack, Clark continues to equate the belt drive system of

the original Velo loader with the drive system set out in the 503 patent. The belt drive system of the original Velo loader was not patented. In arguing that the White patent was in fact the Velo loader drive system, Clark still has the burden of showing the Velo loader drive system more pertinent art to the cam actuated clutch drive system set out in the 503 patent than that cited by the Patent Office.

The White patent, filed June 18, 1956, involves a "steering structure for farm implements and the like". The machine described is a windrower. It is Clark's intimation that this was the machine Eddie Velo described to the Kellers in the summer of 1956. Velo's testimony forms the basis for Clark's argument that the White patent was prior art. However, Velo could not testify with certainty that this was the Windrower Velo claimed to have examined. Furthermore, there was no evidence submitted at trial, through a Clark expert or otherwise, as to how the White patent might be relied upon alone or in combination with any other patents against the claims of the 503 patent. As relevant prior art, the White patent has limited application. It has more significance to the belt drive of the original Velo loader than the cam actuated clutch drive included within the 503 patent. The White patent was not, as Clark describes, the "genesis of the 503 patent."

The original Velo loader incorporated a final belt-drive as has been previously described, which utilized a shiftable idler pulley movable back and forth in an arcuate slot so as to force the belt against one or the other of a pair of drive pulleys from which power was transmitted to the loader wheels for forward and reverse drive operation by an over and under final drive belt. As has been stated, prior to the critical date of the 503 patent, the Velo loader did not incorporate the claimed features of the cam actuated clutch drive.

Clark attempted to reconstruct the invention included in the 503 patent by modifying the Velo loader by reference to the cited Schreck and Hellwarth patents. Clark's expert, Butler,

drew a composite sketch representing his structural combination of the Velo belt drive with the elements of Schreck and Hellwarth (Ex. 100). In abbreviated terms, the Schreck patent (2,336,642, Ex. 85) incorporated a clutch controlled, reversible driving mechanism for a tractor unit utilizing endless belts or chains in an over and under wrap configuration with friction clutch plates. The Hellwarth patent (1,470,078, Ex. 86) relates to a transmission system but also shows a sliding cam for activating friction plate clutches disposed between the clutches and operated by a control lever.

[13] Upon consideration of Clark's argument and the evidence submitted thereon, the Court concludes such reasoning reflects nothing more than hindsight on the part of Butler. First, the Velo loader does not contain all the essential elements of the 503 patents. Nor is it a reduction to practice of the 503 claims. The Patent Office cited, considered and rejected the most pertinent prior art in this case, Schreck and Hellwarth. This consideration serves to preserve the strength of the presumption of validity. See Leach v. Rockwood & Co., 404 F.2d 652, 654, 158 USPQ 518, 519, 520 (7th Cir. 1968); Williams v. V.R. Myers Pump & Supply, Inc., 371 F.2d 192, 194, 152 USPQ 1, 2, 3 (7th Cir. 1966).

Woodstream Corp. v. Herter's Inc., 446 F.2d 1143, 170 USPQ 330 (8th Cir. 1971), comments succinctly on the aspect of "hindsight".

> "In retrospect, many creative developments seem commonplace. The critical question under Graham is whether at the time of the invention the subject would have been obvious to one skilled in the art. The Court noted in Graham that the inquiries and tests it set out in that opinion might serve to 'guard against slipping into use of hindsight * * * and to resist the temptation to read into the prior art the teachings of the invention in issue.' 383 U.S. at 36, 86 S.Ct. at 703, 148 USPQ at 474. See Shaw, supra, 417 F.2d at 1106, 163 USPQ at 587, 588; Columbia Broadcasting Sys. v. Sylvania

Electric Prod., Inc., 415 F.2d 719, 728, 162 USPQ 577, 582, 583 (1st Cir. 1969), cert. denied 396 U.S. 1061, 90 S.Ct. 755, 24 L.Ed.2d 755, 164 USPQ 321 (1970); National Dairy Products Corporation v. Borden Company, 394 F.2d 887, 891, 157 USPQ 227, 230, 231 (7th Cir.), cert. denied, 393 U.S. 953, 89 S.Ct. 378, 21 L.Ed.2d 364, 159 USPQ 799 (1968); National Connector Corp., supra, We think the remarks of Judge Learned Hand in two separate patent cases to be most apropos within the limited context of the record presented here. In B. G. Corporation v. Walter Kidde & Co., 79 F.2d 20, 22, 26 USPQ 288, 289 (2d Cir. 1935), he noted:

> All machines are made up of the same elements; rods, pawls, pitmans, journals, toggles, gears, cams, and the like, all acting their parts as they always do and always must. * * * But the elements are capable of an infinity of permutations, and the selection of that group which proves serviceable to a given need may require a high degree of originality. It is that act of selection which is the invention; and it must be beyond the capacity of commonplace imagination.

Later, in Reiner v. I. Leon Co., 285 F.2d 501, 128 USPQ 25 (2d Cir. 1960), Judge Hand made the following observation concerning the role of a court in patent litigation:

> The test laid down [for obviousness] is indeed misty enough. It directs us to surmise what was the range of ingenuity of a person 'having ordinary skill' in an 'art' with which we are totally unfamiliar; and we do not see how such a standard can be applied at all except by recourse to the earlier work in the art, and to the general history of the means available at the time. To judge on our own that this or that new assemblage of old factors was, or was not, 'obvious' is to substitute our ignorance for the acquaintance with the subject of those who were familiar with it. There are indeed some sign posts: e.g. how long did the need exist; how many tried to find the way; how long did the surrounding and accessory arts disclose the means; how immediately was the invention recognized as an answer by those who used the new variant? [285 F.2d at 503-504], 128 USPQ at 27-28

Cf. Graham, supra, 383 U.S. at 36, 86 S.Ct. 684, 148 USPQ at 474; White v. Fafnir Bearing Company, 389 F.2d 750, 754, 156 USPQ 657, 659, 660 (2d Cir. 1968)." 446 F.2d at 1156-57.

Although by hindsight the claims of the 503 patent may have appeared obvious, Clark has failed to produce sufficient evidence to establish that the invention included within the 503 patent was obvious in light of prior art *at the time of the invention* to one ordinarily skilled in the art. The only evidence which Clark offered on the question of how to combine Schreck and Hellwarth with the original Velo loader to arrive at the claimed structure of the 503 patent was the testimony of Butler. That testimony, as Butler himself acknowledged to an extent, was based on hindsight. Clark has the burden of overcoming by "substantial evidence" the presumption of patent validity. Clark has failed to prove by "substantial evidence" how the prior art — Schreck, Hellwarth, and the Velo loader, if it were to be considered prior art, — can be combined to meet the claimed structure of the 503 patent, without hindsight.

Assuming arguendo that the Velo loader is prior art, the deficiencies in that loader were easily recognized by both the Kellers and Velo. The most significant problem involved the heating, and subsequently expanding and slippage of the belts which resulted in the loss of driving and steering control. Installation of clutches was a solution, but there existed a gap in the teaching of the prior art — Hellwarth and Schreck — as to how to install clutches in such a way to be able to actuate them to maintain steering and forward and reverse control in a smooth and effective manner from the operator's compartment. The Kellers conceived a new clutch drive mechanism, and in addition combined with it an effective, positive cam actuated

clutch mechanism which proved to be highly effective and commercially successful. The solution by the Kellers was not readily obvious to one having ordinary skill in the pertinent art.

The Loyd patent was cited by the United States Patent Office in the prosecution of the 503 patent, particularly for its general vehicle structure. It discloses a self propelled vehicle having independently rotatable propulsion wheels on each side. For reasons noted above, the Velo loader if it is "prior art" is no better prior art than the Loyd patent. The Patent Office examined and cited the most pertinent prior art.

117 Patent
The Evidence, Findings and Conclusions
I. Generally

1. U.S. Patent No. 3,231,117 was issued jointly to Clifford E. Melroe and to Defendant Louis J. Keller on January 15, 1966, and is entitled "TRACTOR VEHICLE AND DRIVE THEREFOR". (The 117 patent was introduced as Exhibit 150, and is attached in the appendix to this Memorandum. The Patent Office record (file wrapper) of the 117 patent was introduced as Exhibit 323.

2. The application for the 117 patent was filed October 23, 1962. (Exhibits 150 and 323).

3. The principal features recited in Claims 1-3, 15 and 18 which contributed to the allowance of these claims are the pairs of rotary threaded actuators for actuating the clutches of the vehicle. The rotary threaded clutch actuators are illustrated in Figures 7 and 8 of Exhibit 150. (Exhibits 156 and 161 are blow-ups of Figure 7 and 8 of the 117 patent). Each threaded actuator is designated generally by the reference numeral 95 and includes an externally threaded element 96 which engages an internally threaded element 99. One rotary actuator of each pair has right-handed threads while the other actuator has left-handed threads.

4. The principal features which contributed to the allowance of claim 9 of the 117 patent are the location of the upright stanchions adjacent the rear end of the vehicle body on each side of the engine space, and the location of the pivot point of the lifting arms to permit the lift arms to extend forwardly along a side of the vehicle body past the operator's seat. In realtively unambiguous terms, Claim 9 defines the stanchions as being in a substantially vertical position at the rear of the body and locates the pivotal mounting between the upper ends of the stanchions and the lift arms rearwardly of the rearmost portion of the seat. (See Figures 1 and 2 of the 117 patent — Exhibit 150). The engine space, to which the placement of the stanchions is related, is located below and rearward of the operator's seat.

5. The substantially vertical position of the stanchions on the rear of the body and the location of the pivotal connection of the lift arms rearwardly of the operator's seat provides the inherent functional and operational benefit of having the entire mass or weight of the stanchion acting on the rear axle. The structural features and relationships defined in Claim 9 provide the functional and operational benefit of a longer, flatter lifting arc which eliminates forward tipping of the loader while maneuvering with a load.

6. The principal features recited in Claims 10-14 which contributed to the allowance of these claims are the hollow side compartments which extend the length of the body and are connected by bridging members disposed to define an engine space between the compartments adjacent to the rear of the body and a forward space between the compartments adjacent to the front of the body. The forward space contains the controls for the manipulation of the tractor by the operator. An operator's seat is positioned between the engine space and the forward space with the operator's legs extending into the forward space. Those claims further describe the position of the stanchions projecting upwardly from the rear of the body and

the pivot point at which the lifting arms are connected to the stanchions.

7. The structural features recited in Claims 10 through 14 provide an inherently functional weight distribution with respect to the front and rear axles of the loader embodied in the 117 patent. When the material handling member of the loader is unloaded, approximately 70% of the weight of the loader is on the rear axle and 30% of the weight of the loader acts on the front axle. This weight distribution allows the operator to skid steer the loader. When the material handling member is loaded, the weight distribution shifts, with approximately 70% of the weight acting on the front axle and 30% on the rear. Again the uneven weight distribution provides maximum efficiency in skid steering.

8. The 117 patent embodies the features of a commercial production model M-440 Melroe loader.

II. Reduction to Practice of the Structure

A. M-400

9. By December, 1960, the M-200 Melroe Loader was modified by adding a rear axle and two driven wheels. This hybrid machine became identified and was sold as the M-400 loader and was identical in all other respects to the M-200 loader (Exhibits 155, 162, 173, 200).

10. The M-400 loader was demonstrated to representatives of the Farmhand Company (hereinafter "Farmhand") at Gwinner, North Dakota, December 1, 1960. The M-400 was in commercial production not later than December 1, 1960, and was later sold both as the F2 (Farmhand) and the Melroe M-400 loader (Exhibit 200).

11. The following trial exhibits disclose the structure of the M-400, or Farmhand F2 loader:

(a) Exhibit 155, "Operator's Manual – Melroe M-200, M-400 Self Propelled Loader". See also Exhibit 256.

(b) Exhibits 276-289 inclusive are photographs of the M-400 loader.

(c) Exhibits 225 – Farmhand Sales Literature.

(d) Exhibits 159, 160, 162 and 173 are blow-ups of drawings included within Exhibit 155, the M-200 M-400 Operator's Manual.

12. The essential features embodied within the 18 claims of the 117 patent (and as enumerated in Findings 3-7 above) were not reduced to practice or contained in either the M-200 or M-400 loader.

B. Preproduction M-440 Loaders

13. In 1960 and early 1961, the Melroe organization was having difficulty maintaining their loader field profitably, and due partially to the insistence of Louis Keller, Melroe decided to experiment with new loaders instead of leaving the loader market.

14. The new loader eventually became known as the M440, and in contrast to the old M200 and M400 models which were painted red and yellow, the M440 line adopted the color white to make it more appealing to the fertilizer industry.

15. The evidence established Melroe built four pre-production loaders prior to manufacturing the M440. All were built in 1961.

16. The first preproduction machine was built by Clyde Olson, an engineer with Melroe, and Louis Keller. It is depicted in Exhibits 125-128, 341 and 342 (hereinafter referred to as the "Clyde Olson" machine).

17. The second preproduction machine was the machine tested by Louis Keller at the gravel pit near Gwinner, North Dakota, and is depicted in Exhibits 130-132, 381-384 and corresponding slides (hereinafter referred to as the "gravel pit" machine).

18. The third known preproduction M-440 loader is depicted in Exhibits 133-136 (hereinafter referred to as the "third prototype").

19. The fourth loader (hereinafter referred to as the Fourth Prototype) was built for tooling purposes and is allegedly depicted in a number of photograph exhibits. However, the evidence is inconclusive and the Court is unable to conclude which, if any, photograph depicts the Fourth Prototype.

C. Clyde Olson Loader

20. The Clyde Olson loader was finished not later than the end of February, 1961, since Mr. Olson left Melroe's employment during that month.

21. The informal minutes of a meeting between Melroe personnel and Farmhand make reference to "... a new four wheel drive model [which] could be developed as a standard unit ...." Based on the sparse evidence surrounding this meeting, any significance attached to this allusion by either Clark or the Court would be unwarranted speculation. (Exhibit 200).

22. The Clyde Olson loader clutch system had slide cam type clutch actuators exactly as those employed in the M-200 and M-400 loaders (Exhibits 155, 199). The first prototype moderately redesigned the stanchions, retaining only the upper portions of the stanchions used on the M-200, M-400 machines (Exhibits 125-128, 155).

23. The rear casting and counterweights on the M-400 were eliminated and the side compartments extended back; they were enclosed to contain fuel, hydraulic oil, and lubricating oil for the transmission, and a grill was attached which served as a counterweight.

24. A loader with the Clyde Olson configuration was never put into production.

25. The prototype machine known as the Clyde Olson loader

had few, if any, of the elements of the 18 claims of the 117 patent.

D. Gravel Pit Loader

26. Between the completion of the Clyde Olson loader and May, 1961, a second prototype machine was constructed and designed by Clifford Melroe, Gordon Irwin and Louis Keller. It was painted red and yellow.

27. The completion date of the second prototype is unknown; however, slides taken of the loader were dated "May, 1961", and the inference would arise the machine was constructed prior to or during that month.

28. The Gravel Pit Loader was tested extensively by the employees of Melroe, including Louis Keller, in a gravel pit near Gwinner, North Dakota, as well as at the home of Cyril Keller in Rothsay, Minnesota.

29. The Gravel Pit Loader differed from the Clyde Olson machine in several major respects:

(a) The configuration of the frame was changed from a somewhat triangular shape to a rectangle, and

(b) The structure of the boom bucket mechanism and uprights were redesigned.

30. The prototype machine known as the Gravel Pit loader, did not include all the elements of the 18 claims of the 117 patent. Significantly it did not incorporate the concept of threaded clutch actuators.

E. Third Prototype.

31. A Third Prototype was completed sometime after July 4, 1961, and probably before August 1, 1961. It was constructed jointly by Louis Keller, Gordon Irwin, a Melroe engineer, and Cliff Melroe. The Third Prototype was painted white.

32. The Third Prototype had the slide cam type clutch

actuators and was improved and changed in accordance with the data compiled by testing the Gravel Pit Machine.

33. The Third Prototype was sent to Imperial Eastman Company in Manitowac, Wisconsin, for the installation of hydraulic plumbing. This prorotype incorporated changes found necessary from testing on the Gravel Pit prototype. One significant change was the reinforcement of the boom arms found necessary after testing at the home of Cyril Keller over the July 4th weekend in 1961. (See Exhibits 433, 433A, and Exhibit 137, a drawing dated 6-2-61 relating to the lower section of the boom on the loader).

34. After the installation of the plumbing by Imperial Eastman, the Third Prototype was used by Louis Keller as a testing machine in the gravel pit area at Gwinner, North Dakota. The machine was tested in Gwinner during August, 1961, and into September, 1961. That gravel pit testing convinced Louis Keller that the tapered clutch actuator design had limitations. The most dramatic problem was the sticking of the slide cam actuators which would cause the machine to cant or jerk unexpectedly. Such motion by the machine was a danger to the operator. In addition, the clutches would "oil can" and the side plates bow, causing the clutches to slip.

35. The evidence shows the first threaded actuator mechanism was probably installed in a loader in September. The evidence is inconclusive. A testing program commenced sometime thereafter, and the results were such that the decision was made to go into production with a new loader line, the M-440, which production began in December, 1961.

F. Threaded Rotary Actuator.

36. The concept for the right and left hand threaded rotary actuators to operate clutches was developed by Louis Keller and Clifford Melroe.

37. An Orval O'Neil drawing, Exhibit 141, of a clutch

assembly implementing a threaded actuator concept roughly dates the development of the threaded rotary actuator. The drawing is dated July 24, 1961, and shows an approval date of October 13, 1961.

38. Cliff Melroe constructed a model of the threaded actuator assembly prior to the drawing of Exhibit 141 by O'Neil.

39. The threaded actuator assembly was placed into a loader which had flat clutch plates, but there was difficulty in attaining good clutch power transmission. The clutches tended to slip and could not be solidly engaged. This loader was the fourth prototype and was referred to at trial as the Cy Keller demo.

40. As a result of the difficulties with the flat clutch plates, a bench test was conducted. The bench test disclosed that the problem was caused by the "oil canning" of the clutch plates. (The term "oil canning" refers to the flexing of the clutch plates in a manner similar to the bottom of a round oil can when pressure is applied at the center).

41. The assembly, depicted in Exhibit 141, was designed by Orval O'Neil as a means of eliminating the oil canning problem. The design of the clutch plates was changed to the shape of a dome to gain strength along the axis of the clutch lining.

42. Exhibit 147 is a detailed drawing of Item 8 on Exhibit 141, the input clutch. Exhibit 147 also depicts the oil pickup slots on the input clutch which was designed to pick up oil for the clutches which would be thrown about the inside of the gear case by the chains. The concept was to lubricate the clutch linings. The pickup slots were necessarily cut left and right since the input clutches would be used on both sides of the machine and would be turning in both directions. Exhibit 147 is dated July 29, 1961, and has an approval date of October 13, 1961.

43. The type of drive in a loader could be recognized by the type of nut on the outside of the side compartment. The

tapered slide cam type clutch actuator had a jam nut and large hexagon nut as seen on Exhibits 135, 136 and 133. The threaded clutch actuator had a castigated nut as illustrated on drawing Exhibit 141.

44. The dates on Exhibits 141 and 147, July 24 and July 29, 1961, respectively, are not accurate dates as to the reduction to practice of the dome shaped clutch plate or the oil pickup slot. These two developments were in response to problems incurred in operation of the Fourth Prototype in which the threaded clutch actuator was installed. Therefore, the "reduction to practice" occurred at least after the first experience with the threaded actuator. The best evidence shows Exhibits 141 and 147 were drawn over a period of several months, during the time in which the threaded actuators were placed into the 4th Prototype and the problems discovered.

G. 4th Prototype

45. The fourth preproduction four wheel loader was built for the purpose of a check out on the final production tooling. This machine included the clutch and drive assembly as depicted in Exhibit 141, including in particular the threaded clutch actuators identified as element 6 and the oil caps identified as element 14 of Exhibit 141.

46. O'Neil, the Melroe engineer who drew Exhibit 141 to alleviate problems encountered on the fourth prototype, was unable to recall any event which would show the fourth prototype was built prior to the fourth quarter of 1961. In any event, the construction of the clutch assembly in drawing Exhibit 141 would have taken a period of time to construct since it was being made for the first time and the designers were dealing with fairly complicated parts.

47. The 4th Prototype was completed after the third prototype but prior to the mass production of the 440 loaders. Like the third prototype, it was painted white.

48. The 4th Prototype also had vertical ribs on its side plates which stiffened them and prevented them from bowing.

49. There was a great deal of contradictory evidence submitted to date the construction of the 4th Prototype. That date is crucial since the parties do agree this loader was the first to incorporate all elements of the threaded clutch actuator concept eventually put into the M-440 production. The most credible evidence establishes that date to be near the end of the third quarter of 1961.

50. Clark suggests the fourth prototype machine was delivered not later than August, 1961, to Cyril Keller for use as his demonstrator machine. The conclusion is based on the oral, uncorroborated testimony of John Sayers.

51. The Court attributes little weight to the testimony of John Sayers, a former salesman for Melroe, for the following reasons:

(a) On direct examination the witness had a remarkable facility for remembering precise details relating to events 14 years back. On cross examination he was vague, indefinite and evasive. The Court's impression is that he was a partisan advocate and contributed little or nothing to the Court in its responsibility for searching out the truth.

(b) The witness's testimony regarding the demonstration activities of Cyril Keller in the summer of 1961 is rebutted by Keller and considering the record as a whole, the Court attributes credibility to Keller's testimony rather than Sayers'.

(c) Cyril Keller denied having given John Sayers Exhibit 208, a picture of the gravel pit machine at Keller's home in Rothsay, Minnesota, on July 4, 1961. Keller's testimony is that he gave certain slides of that event to Melroe's patent attorney, John Swindler, at his request for use in the Universal lawsuit, including the slide of Exhibit 208. The slides were never returned.

(d) Cyril Keller also testified he did not receive a M-440 type demonstrator until the end of November or the first part of December, 1961. Prior to that and during the summer of 1961, he demonstrated an M-400 M-200 model.

(e) Cyril Keller testified there was no new type white loader at the 1961 Minnesota State Fair. The loaders exhibited at the 1961 Minnesota State Fair were M-400 and M-200. In 1960, the M-400 would not have been available and by 1962, the M-444 model was in production (Exhibit 434).

(f) Keller further testified he did not transport a white loader to Minneapolis in the summer of 1961, and further it would have been physically impossible to transport a loader, two loader buckets and a manure fork in a pick-up truck as Sayers testified had happened.

(g) Keller specifically testified he did not have a new type white loader in the summer of 1961, nor could he ever recall demonstrating any type of Melroe loader with John Sayers.

(h) Sayers' testimony is also contradicted in part by the testimony of Orval O'Neil. (i) Sayers' testimony is further contradicted by demonstrative evidence.

(j) Sayers' testimony that he received a new white loader for demonstration purposes in July, 1961, is not corroborated by any of the other evidence in the case and is not credible.

52. At different points in the trial, a number of photographs were admitted into evidence purporting to be photographs of the fourth prototype. Among those are Exhibits 21-25, 27, 103-118, 165-167, 208-213, 214-218, 236-239. In most cases, the photographer was unknown. Their significance was related to the testimony of various witnesses who in one way or another attempted to date the entry of the fourth pre-production loader into the loader market.

53. In all cases, the witnesses made identification on the basis of outward appearances. None of the photograph exhibits expose the insides of the side compartment and only one witness, John Sayers, alleges he examined them.

54. Exhibits 165-167 were identified by Orval O'Neil as the fourth prototype loader, noting specifically the location of the instrument panel and the construction of the side panels with vertical stiffening ribs. However, O'Neil was unable to date the construction of the fourth prototype. There was no further oral testimony, other than Sayers' allegation, that this fourth loader was used by Cyril Keller as a demonstrator, nor was there any testimony that it was constructed at such a time that Cyril Keller could have used it as a demonstrator prior to the last quarter of 1961.

55. O'Neil identified the machine depicted in Exhibit 24 and Exhibits 214 through 218 as also being the fourth prototype, this time citing the presence of vertical ribs on the side plates, the configuration of the fabricated rear grill, the configuration of the seat mounting brackets and the location of an hourmeter. And based on a comparison of these components to the same elements on the machine depicted in Exhibits 103-118, O'Neil testified that machine was not the fourth prototype. The machine in Exhibits 103-118 is presently owned by David West and has the Serial Number 1599. It is Clark's contention the West machine is the fourth prototype. The owner of the machine refused to permit it to be disassembled.

56. The West machine depicted in Exhibits 103-118 does not have an air scoop, a feature included on the fourth prototype according to O'Neil.

57. John Sayers identified the machine depicted in Exhibits 209 through 213 as photographs of a loader which Cyril N. Keller had in his possession in July or August, 1961. This is a loader Sayers alleges he inspected in detail. However, a comparison of Exhibit 210 (identified by Sayers as Cy Keller's Demonstrator), Exhibit 215 (identified by O'Neil as the fourth prototype) and Exhibit 114 (the West machine also said to be Cyril Keller's Demonstrator), show these machines to be different from each other. The configuration of seat reversing brackets in Exhibit 215 are different from the configuration of

the seat reversing brackets shown in Exhibit 114, while the machine depicted in Exhibit 210 has no seat reversing brackets. Further comparing Exhibit 213 (identified by Sayers as being the Cy Keller Demo), Exhibit 216 (identified by O'Neil as the fourth prototype) and Exhibit 115 (the West machine asserted by Clerk to be the Cy Keller Demo) clearly shows that the fabricated rear grills of these three machines are different from one another. The grill depicted in Exhibit 216 is different in construction and configuration from that depicted in Exhibit 115 and Exhibit 213. Further, an examination of the grill of the machine depicted in Exhibits 211 and 213 shows the small centrally located power take-off plate is on the exterior rear surface of the grill bars, while the small centrally located power take-off plate shown on the rear grill of the West machine in Exhibits 111 and 115 is located on the interior surfaces of the grill bars. However, an examination of Exhibits 214 through 218, and Exhibits 209 through 213 shows both machines are provided with the side plates having vertical ribs.

58. The machine depicted in Exhibits 236 through 239 (alleged by Sayers to be his Demonstrator) discloses a machine provided with side plates having vertical ribs while the machine depicted in Exhibits 133 through 136 (also alleged by Sayers to be his Demonstrator) discloses a machine provided with side plates but having horizontal ribs. The machine depicted in Exhibits 133 through 136 is not the machine depicted in Exhibits 236 through 239.

An examination of the machine depicted in Exhibits 236 through 239, the machine depicted in Exhibits 209 through 213, the machine depicted in Exhibits 214 through 218, and the machine depicted in Exhibits 111 and 115 show that the respective rear grills of these machines are entirely different one from another. Yet, the machine depicted in Exhibits 236 through 239, the machine depicted in Exhibits 214 through 218 disclose loaders provided with side plates having vertical ribs.

The record does not support a finding that the loader

depicted in Exhibits 166 and 167 was ever delivered to Cy Keller, nor does it support a finding that the loader depicted in Exhibit 165 is the same loader identified in Exhibits 166 and 167. Further, the record does not support a finding that the loader depicted in Exhibit 24, Exhibits 214 through 218, 166 and 167 was ever delivered to Cyril Keller prior to the fourth quarter of 1961.

III. Sale Activity Surrounding a New Melroe Loader Incorporating a Threaded Clutch Actuator.

A. 1961 Minnesota State Fair.

59. There is conflicting testimony as to whether there was a white Melroe loader at the Minnesota State Fair in 1961.

60. The Minnesota State Fair in 1961 was held August 26 through September 4, 1961.

61. In 1961, Robert A. Christopher was employed by Gould, Brown & Bickett as its public relations director and as such was in charge of all product news publicity.

62. Gould, Brown & Bickett was retained by Melroe no later than August 19, 1961, to commercially promote "the redesigned Melroe loader . . . ." (Exhibit 177).

63. Lynn Bickett of Gould, Brown & Bickett, Roger Melroe, Cliff Melroe, Syl Melroe and Les Melroe of the Melroe Manufacturing Company were present at a meeting which took place on August 19, 1961, at Gwinner, North Dakota.

[14] 64. The stated purpose of the August 19, 1961, conference was to make basic promotional plans for introduction of the redesigned Melroe Loader in the industrial field." The minutes did not reflect a model number, nor did they set out any details with respect to the "redesigned Melroe Loader". The minutes do not constitute an "offer for sale" of the M-440 Loader within the meaning of 35 U.S.C. § 102(b).

65. At the August 19, 1961 meeting, Sylvan Melroe agreed

to provide Gould, Brown & Bickett with information and photographs of the new loader. Photographs were sent in September and were attached to a News Release dated October 20, 1961. The photographs had been retouched by Gould, Brown & Bickett to depict the new "Bobcat" logo in place of the old Melroe logo (See Exhibit 181, pg.4 and Exhibit 204).

66. Christopher testified he observed a loader such as the one depicted in Exhibit 204 at the 1961 Minnesota State Fair at the Melroe exhibition.

67. The tradename "Bobcat" was not adopted for any Melroe product until sometime after the Minnesota State Fair and before the October 20, 1961 press release.

68. As with a great deal of the documentary evidence in this case, most of the exhibits relating to the activities of Gould, Brown & Bickett came from Clark files. The records of Gould, Brown & Bickett had been destroyed sometime after the company had been sold in 1965.

69. Christopher was unfamiliar with front end loaders in general and had never heard of Melroe Manufacturing until August of 1961. He was unfamiliar with the Model Number designations. He recalled no other Melroe products at the Fair.

70. There are no photographs of a white Melroe loader at the Minnesota State Fair in 1961 nor is there any documentary evidence supporting such a finding. The only photograph of the Melroe Exhibit at the Minnesota State Fair in 1961 is Exhibit 434 and 434A, which depict the M-400 Melroe loaders.

71. Sylvan Melroe testified there were no white loaders at the 1961 Minnesota State Fair.

72. On August 25, 1961, Sylvan Melroe wrote to M. K. Ruesch of Cominco Products, Fergus Falls, Minnesota, relating to the Melroe Loader line. The letter made reference to the M-440 series and added as a postscript:

"The M-440 will be on display at the Minnesota State Fair Block #30 — Lot #5 & #6." (See Exhibit 497).

Melroe's testimony was inconclusive as to the letter's origin or meaning. He continued to insist no white loader was present at the 1961 Minnesota State Fair and that the first photographs of any white loader were those sent to Gould, Brown & Bickett in late September, 1961.

73. Cyril Keller testified that no white loaders were at the 1961 Minnesota State Fair.

74. Charles Brown, formerly of Gould, Brown & Bickett, testified he observed and operated a white loader such as the one depicted in the photographs in Exhibit 181.

75. The evidence relating to the presence of an M-440 at the 1961 Minnesota State Fair is inconclusive and is not sufficient to support a finding that a White Melroe loader was on display at the 1961 Minnesota State Fair.

B. Advertising Activity

76. The critical statutory bar date on the 117 patent under 35 U.S.C. § 102(b) is October 23, 1961. Robert A. Christopher prepared a draft of a news release concerning a New Melroe Loader in September of 1961. The draft (Exhibit 79) was dated September 29, 1961, and was sent to Sylvan Melroe in Gwinner for his approval.

77. After certain changes, a final draft of the news release was completed and at a date very close to the critical date of the 117 patent, was distributed to a large number of trade publications and newspapers. (Exhibit 181). The distribution was a sales effort. The news release is dated October 20, 1961. There was no direct evidence as to the date of mailing.

78. The October 26, 1961 edition of the Sargent County Teller published information about the M-440 Bobcat, together with a picture. (See Exhibits 73A, B, C and D). The article was almost a verbatim recitation of the contents of the Gould, Brown & Bickett news release.

79. In a letter dated October 27, 1961, New Equipment Digest indicated they would publish the news release in their

publication (Exhibit 190).

80. A substantial number of sales inquiries resulted from the issuance of the News Release (See Exhibit 196).

81. Exhibit 181, the News Release, indicated the M-440 Bobcat loader would be sold for $2,750.

C. Farmers Union Central Exchange.

82. Howard Hull, manager of the Soil Service Centers for Farmers Union Central Exchange (now CENEX), on October 4, 1961, authorized the purchase of "3 Loaders with Fertilizer bucket Model 440" from Melroe Manufacturing Company, (Exhibit 29). The price was $2,750 each and a November delivery was indicated.

83. Exhibit 29 was a Farmers Union Purchase Order dated October 3, 1961. Exhibit 28 was a Melroe order form relating to the same transaction and covers several points:

(a) Reference is made in it to Farmers Union Central Exchange Purchase Order No. S-02947;

(b) The salesman was Wallace Shelly;

(c) "3 Model 440 Loaders with Fertilizer Buckets" at $2,750 each were ordered; and

(d) The loaders were to be for the following Farmers Union Central Exchange Plants, which were fertilizer plants then under construction:

(i) 1 unit Casselton

(ii) 1 unit Lake Presston

(iii) 1 unit Britton.

84. The purpose of Exhibit 29 was to buy three loaders, Model number M-440.

85. The Melroe order form, Exhibit 28, predates the Farmers Union Central Exchange Purchase Order, Exhibit 29, by one day. Exhibit 28 was prepared based on information given during a telephone call, it carries the same purchase order number as Exhibit 29 and states "confirmation will follow".

86. The order from Farmers Union Central Exchange was acknowledged by Melroe on October 4, 1961. (Exhibit 30).

87. Howard Hull testified Exhibit 29 was prepared and handled in the ordinary course of business.

88. There is no direct evidence that Melroe ever received a copy of Exhibit 29, nor is there direct evidence that Farmer's Union Central Exchange ever received a copy of Exhibit 28.

89. Hull testified that prior to preparing the confirmation (Exhibit 29), representatives of the Melroe Manufacturing Company demonstrated a white front end loader to him and other representatives of Farmers Union Exchange in St. Paul and Dundas, Minnesota.

90. Hull further testified the machine he saw demonstrated was white and resembled the one depicted in the photographs, Exhibits 21, 22, 23, 24, 25 and 27.

91. The first production model of the M-440 was delivered to Farmers Union Central Exchange at Britton, South Dakota. The Bill of Lading is dated January 4, 1962 (Exhibit 33). The machine was Serial No. 1601 (Exhibit 122).

92. Hull's testimony relating to the demonstration at Dundas, Minnesota, of a white front end Melroe Loader called the M-440 was corroborated by the testimony of Elden Evjen. Evjen, at the time, was operations supervisor for the Farmers Union Central Exchange Soil Service Center Department and attended the Dundas demonstration "in the late summer or early fall" of 1961.

93. The testimony of both Hull and Evjen was supported by the testimony of Victor B. Gehrman, who was a service manager for Farmers Union Central Exchange in 1961.

94. Gehrman testified he saw two demonstrations of a white Melroe front end loader in 1961. One demonstration was in St. Paul, and the other at Dundas, Minnesota.

95. Gehrman testified as did Evjen and Hull that Farmers Union Central Exchange would not have purchased the front end loaders without a demonstration since the loader was a new

product.

96. Gehrman also stated the loader depicted in Exhibits 21-24 were similar to the loader he saw demonstrated.

97. Gehrman testified that the Melroe representatives indicated that the loader would be available about January, 1962.

98. Neither Gehrman, Evjen nor Hull could testify to to the structural features of the white loader they saw demonstrated.

D. Midland Cooperatives.

99. During 1961, Midland Cooperatives was engaged in the construction of bulk fertilizer blending plants in Minnesota, Wisconsin, and North Dakota.

100. Ora Alvin Messick was employed by Midland Cooperatives from February, 1961, to February, 1965, and one of his duties was the task of establishing numerous company owned rural fertilizer plants. The initial step in establishing the plants was to request an "Authority for Expenditure" (See Exhibits 8, 10).

101. Representatives of Melroe demonstrated a new white front end loader to personnel of Midland Cooperatives. The loader was observed by Mr. Messick during this demonstration prior to an alleged offer to purchase a number of the new loaders by Midland Cooperatives. Messick identified the machine demonstrated to be similar to the drawings in Exhibit 26, which depicts an M-440 Bobcat.

102. Messick testified generally as to the date of the demonstration — in the late summer or early fall of 1961 before the construction of the fertilizer plants commenced and prior to ordering the machines.

103. Messick recalls the demonstration since the new loader appeared to solve problems Midland had encountered with other loaders. The machine was strong, durable and had the ability to "turn short" enabling it to maneuver in boxcars.

Further, Midland was particularly concerned with whether the clutch system was enclosed in an oil bath, a missing feature on other loaders. The new Melroe loader demonstrated did have an enclosed oil bath clutch assembly.

104. Midland understood the purpose of the demonstration to be the sale and purchase of the new Melroe loader.

105. Messick identified the loader depicted in Exhibits 21-24 as "similar" to the one demonstrated.

106. Exhibit 12 is a purchase order for nine M-440 with fertilizer buckets placed by Midland Cooperatives on September 29, 1961, for loaders to be delivered to Mountain Lake, Minnesota; Baldwin, Wisconsin; Warren, Minnesota; Park River, North Dakota; Portland, North Dakota; Wausau, Wisconsin; Britt, Iowa; Barnesville, Minnesota; and Herman, Minnesota. Exhibit 12 was described by Ardell Hansen, Melroe's traffic manager in 1961, as a purchase order. Hansen was familiar with Melroe's salesman's order forms and invoices. His job in 1961 required him to handle copies of all sales invoices since he had the responsibility of shipping all Melroe products.

107. In a letter from Lynn Bickett of Gould, Brown & Bickett to Sylvan Melroe, dated September 29, 1961, Bickett stated: "Incidentally, Les got over a 20,000 order out of Midland this morning." (Exhibit 490). The order from Midland Cooperatives was taken by "LWM", who was identified as Lester Melroe, who was in charge of the Minneapolis office of Melroe at the time.

108. The order for the loaders was processed in the normal course of business of Melroe (Exhibits 13-20).

109. The following M-440 loaders were shipped to Midland Cooperatives.

Midland Cooperatives Plant	Serial No. of Loader
Baldwin, Wisconsin	1602
Park River, N. Dak.	1607
Portland, N. Dak.	1609
Wausau, Wis.	1624
Warren, Minn.	1637
Barnesville, Minn.	1661
Mountain Lake, Minn.	1666
Britt, Iowa	1667
Herman, Minn.	1668 (See Exhibit 122)

110. A former employee of Midland Cooperatives, Dale B. Swenson, who was the branch operating manager at the Midland fertilizer plant at Waseca, Minnesota, in 1961, testified to a demonstration of a white front end loader by Les Melroe. After examining Exhibits 21, 22, 23, 24, 25 & 27, Swenson stated they were photographs of the white front end loader he saw demonstrated at the Waseca Midland Cooperative facility. The demonstration took place in September or October of 1961, and the individual operating the machine in Exhibits 21, 25, 27 was Robert Hilderbrandt, a Midland Cooperative employee at the Waseca plant in 1961. The loader which was demonstrated had clutches which operated in an oil bath.

111. On September 12, 1961, Sylvan Melroe wrote to Lynn Bickett and stated:

> "We did stop at the Midland Plant in Waseca on the way to Albert Lea, and I did get some pictures of the Midland operation with the Loader. The Midland people were very impressed with the Loader. I hope some of these pictures will be suitable for a literature sheet. It seems to be the feeling of everyone here that we should try to crack the fertilizer market first." (Exhibit 489).

Exhibit 471 is a copy of a portion of a calendar purporting to

be that of Cyril Keller's in 1961. This was another document which left Keller's possession to attorneys for Melroe in the prosecution of prior law suits. An entry on Friday, September 8, records the words "Elbert Lee". Cyril Keller identified his writing.

112. Sylvan Melroe testified he did not take photograph Exhibits 21-25 and 27, and has no recollection of making any photographs at Midland's Waseca plant on or about September 12, 1961.

113. Exhibit 205 appears to contain three photographs of a White loader at the Midland Cooperative's facility in Waseca, Minnesota. The photograph in Exhibit 205 above the caption "Bins, Boxcars, Etc." was identified as the same as Exhibit 27. The center photograph on Exhibit 205 appears to correspond with Exhibit 25 and the lefthand photograph on Exhibit 205 appears to correspond to Exhibit 24.

E. Other Sales

114. Evidence of possible sales to Christiansen Equipment Co., Elbow Lake, Minnesota, and Rich's Fertilizer Service, Roy, Minnesota, prior to October 23, 1961, is insufficient to establish an offer of sale or sale was in fact made to either of these concerns.

IV. Issue of Obviousness
The Scope and Content of the Pertinent Non-Cited Prior Art.

115. The features of the 18 claims of the 117 patent are substantially identified and described in the Operator's Manual for the M-440 Loader (Exhibit 149).

116. The M-400 was "publicly used" and "on sale" more than one year prior to the filing of the application which led to the 117 patent. The M-400 was not listed as prior art and cited

by the examiner.

117. The application for the 117 patent was filed and prosecuted by John R. Swindler of the law firm of Irons, Birch, Swindler and McKie, 1000 Connecticut Avenue, Washington, D.C., patent attorney for the Melroe Company.

118. Exhibit 323, the file wrapper (Patent Office record) for the 117 patent contains a statement on Page 90 thereof that a collection of advertising literature relating to the vehicle was presented by Mr. Swindler to the Examiner at an interview.

119. With respect to the claimed features upon which Claims 10-16 and 18 were allowed, the M-400 machine as embodied in Exhibit 155 is no better prior art than the prior art of record.

120. With respect to the claimed features upon which Claims 1-8 were allowed, the M-400 machine as embodied in Exhibit 155 is no better prior art than the prior art of record.

121. With respect to the claimed features upon which Claims 9 and 17 were allowed, the M-400 machine as embodied in Exhibit 155 is no better prior art than the prior art of record.

122. The following was suggested by Clark as relevant non-cited prior art patents.

Trial Exhibits	Patentee	U.S. Patent Number
Exhibit 82	Bailey	1,027,027
Exhibit 85	Schreck	2,336,642
Exhibit 351	LeTourneau	2,683,318
Exhibit 352	Zeidler	2,931,476
Exhibit 353	Voss	2,973,876
Exhibit 354	Walstrom	2,731,162
Exhibit 355	Garrett	2,800,188
Exhibit 356	LaTourneau	2,630,638
Exhibit 357	Gerst	2,707,057
Exhibit 358	Burrus	2,789,711

Clark, through its expert, Hobbs, alleges the features of these patents combine to make the 117 patent obvious. Specifically

Hobbs testified:

(a) *The Burrus Patent* relates to a small loader in which the location of the operator's seat is at a high position, mid-way between the rear and forward part of the vehicle with the operator's legs in the forward part of the vehicle and the control means in front of the operator (Exhibits 358, 359).

(b) *The Dunham Patent* shows side compartments of a vehicle which are fluid tight and which can contain either fuel or lubricating fluid. (Exhibits 328, 361).

(c) *The LeTourneau Patents* show vehicles with compartments on the side of a vehicle; power transmitted into the compartments from a central transmission; four wheels which are driven; wheels which are mounted on stub axles; and with wheel tracks greater than the wheel base. The patents also teach skid steering (Exhibits 356, 362, 363).

(d) *The Garret Patent* shows how to place a stub axle into an enclosed side compartment together with sprockets and chains. (Exhibits 355, 364, 365).

(e) *The Schreck Patent* shows how to achieve forward and reverse drive by use of a chain which is driven continuously in one direction. A separate "over and under" chain is arranged with respect to the clutch plates so as to achieve forward or reverse drive. An actuator is shown which causes alternative enlargement of the two clutches with the additional choice of a neutral position. (Exhibits 85, 90, 91).

(f) *The Bailey Patent* is part of the clutch art. It shows the transmission of torque about a common axis. The Bailey Patent contains clutches which operate in pairs so that when one clutch is engaged, the other clutch is disengaged. The clutches are actuated by a cam mechanism which uses three point loading and which has right-hand and left-hand inclined cam surfaces. (Exhibits 82, 366, 368).

(g) *The Walstrom Patent* demonstrates the use of a material handling device on a vehicle. It describes an upwardly extending stanchion located at the rear of the vehicle; a forward extending

arm or boom and a pivot point at the stanchion. (Exhibits 354, 369, 370).

123. With respect to the various features upon which the claims of the 117 patent were allowed, the non-cited art set forth by the Plaintiff with respect to the 117 patent is no better prior art than that relied upon by the United States Patent Examiners.

Differences Between the Non-Cited Prior Art and the Claims of the 117.

124. The essential features embodied within the 18 claims of the 117 patent were not reduced to practice in the M-400 loader.

a. Claim 9 and dependent Claim 17 of the 117 patent define the particular location of the upright stanchions adjacent to the rear end of the body on each side of the engine space (See Finding No. 4). The reasonable construction of the language of the two claims also locates the pivot point of the lift arms completely rearwardly of the rearmost portion of the operator's seat. These structural features are not found in the M-400 nor are the operational and functional benefits which inhere from these features.

b. With respect to Claims 10-14 and Claims 15 and 16, as well, it is not merely the presence or absence of enclosed side compartments and stub axles which distinguish the claims from the M-400 loader, but the specific construction and relationship of these features as well as the advantages flowing from them. (See Finding 6).

c. The M-400 does not have hollow side compartments for containing fluids, nor does it have side walls or any comparable structure which extends the entire length of the vehicle, upon which to mount the stanchions. This factor deprives the M-400 of an important functional advantage of the M-440 design with the tractor design of the M-400. The

weight distribution of the M-400 machine which is exerted on the front and rear pairs of wheels is approximately 55-45%. When the weight distribution on the rear and front pairs of wheels of a skid steer type front end loader is other than approximately a 70-30 ratio, the loader is flatfooted in operation and it is difficult to cause such a loader to skid steer or pivot about its own axis. (See Findings No. 7).

d. The M-400 does not incorporate threaded elements to actuate the clutches.

125. Neither the Clyde Olson prototype nor the Gravel Pit Machine were prior art with respect to any of the claims of the 117 patent. Further, the machines were being used in a non-public experimental program.

126. The United States Patent Office cited the most pertinent prior art patents when it allowed the claims of the 117 patent. The prior art relied on by Clark is no better than that considered and rejected by the Patent Office.

127. The file wrapper of the 117 patent (Exhibit 323) reveals at Page 107 a search of various art classes and subclasses. Specifically in December, 1964; Class 180, Subclass 6.66 and 6.2; Class 74, subclasses 361, 720.5, 664 IV and Class 214, subclasses 131 and 140 were searched by the patent examiner. The searches were brought up to date both in May of 1965 and again in September of 1965.

128. The Garrett Patent, 2,800,188 (Exhibit 355) which Clark alleges as uncited prior art is classified in Class 180, subclass 6.2, a class-subclass searched by the patent examiner in the prosecution of the 117 patent.

129. The Keller 503 patent (Exhibit 53) was also cross-referenced into Class 180, subclass 6.2.

130. Three other patents, Walstrom 2,731,162 (Exhibit 354); Gerst 2,707,057 (Exhibit 357), and Burrus 2,789,711 (Exhibit 358) which Clark alleges as uncited prior art are classified in Class 214, subclass 140, a class-subclass searched by the patent examiner in the prosecution of the 117 patent.

131. The Schreck patent 2,336,642 (Exhibit 85) which Clark alleges as uncited prior art is cross referenced in Class 74, subclass 361, a class-subclass searched by the patent examiner in the prosecution of the 117 patent.

132. The Burrus patent (Exhibit 358) was cited by Clark as more pertinent than Albert (Exhibit 331) cited by the Examiner. Clark's technical expert, Hobbs, found the significant feature on the Burrus patent in relation to the 117 patent to be the location of the operator's seat enabling the operator to have 360° visibility (Exhibit 359). A comparison chart of the Albert Patent, prior art cited by the Examiner, with the non-cited art relied upon by Clark is found in Exhibit 552. Clark has failed to show the Burns patent is more pertinent prior art than Albert.

133. The Voss patent (Exhibit 353) was not cited by the Patent Office in the prosecution of the 117 patent. Voss presents a vehicle for loading and unloading manure with an engine space in the rear and a forward space for the operator's legs and a seat. In comparing Voss with the cited patent Dunham (Exhibit 328, See comparison 551 Clark has failed to show that Voss is more pertinent prior art than Dunham or Albert in this respect.

134. The LeTourneau patents (Exhibits 351 and 356) were alleged by Clark as more pertinent art than the cited Blackmore (Exhibit 324), Leedom (Exhibit 334) and Albert (Exhibit 331) for several reasons:

(a) the enclosed side compartments of the LeTourneau machine absent in Blackmore

(b) The general arrangement of the LeTourneau machine indicates the track width is greater than the machine's wheel base. (See also Exhibits 362 and 363).

The cited and uncited patents are compared in Exhibits 558, 559, and 560. Clark has failed to show that the two LeTourneau patents are better prior art than Blackmore, Leedom and Albert.

135. The Garrett patent (Exhibit 355) was alleged by Clark to be more pertinent prior art for enclosed side compartments on a skid-steered machine having a chain drive. Exhibit 555 compares a drawing of the cited Leedom patent and a drawing of the Garrett patent. The Leedom patent discloses and specifically states that the side compartments on each side of the vehicle contain lubricating fluid and in these side compartments are mounted stub axles which are propelled by chains around sprockets and receive driving force from a driving member extending into that side compartment. The side compartments described in Leedom are better prior art to the claims of the 117 patent than that of Garrett.

136. The Schreck Patent (Exhibit 85, blowup Exhibits 90, 91) is concerned with the drive means for a tractor unit for industrial trucks. The uncited Bailey patent (Exhibit 82, blowup Exhibit 366) relates to a type of clutch actuator consisting of a fixed non-rotatable element and a separate rotatable element. Clark proposes that the combination of the two is pertinent prior art to the threaded actuator concept set out in the 117 patent (See Exhibit 368). There is nothing in either Bailey or Schreck which would lead one of ordinary skill in the art through the progression of Exhibit 368 to the claims of the 117 patent.

137. The Walstrom patent (Exhibit 354) is no better prior art than the cited Guignard (Exhibit 326) and Dingley (Exhibit 327) patents in relation to the material handling members in the 117 patent. (See also Exhibits 556, 557).

138. Clark's expert did not testify with respect to several of the "non-cited prior art" it contends was better prior art than that cited by the Patent Office.

Level of Ordinary Skill

[15] 139. A person of ordinary skill in the small loader art in 1961 would have been a college graduate with an engineering degree or a person with technical experience equivalent to the

training possessed by a college graduate.

Clark's Attempt to Market a Front End Loader Prior to Acquiring Melroe

140. Clark manufactured a small front end loader known as the Michigan 12B which was offered to the same market as the Melroe M-60 and M-200 loaders (Exhibits 429, 511). A modified version of the Michigan 12B was manufactured by Clark and sold as the Clark loader 340.

141. In January, 1967, Clark began an investigation relating to the prospective development of a skid steer loader. This investigation was prompted in part by the commercial success of the one half cubic yard skid steer loader manufactured by Melroe Manufacturing Company (Exhibit 526).

142. Donald A. Holtkamp, an engineer with Clark, became involved in this Clark skid steer development project in 1968 and a skid steer test unit was developed and built under the direction of Holtkamp at Clark's Hancock Division in Lubbock, Texas. This test machine was later designated the Clark 1500 loader and is depicted in Exhibits 528A-528N and in Exhibits 529-529H.

143. The development and testing program of the Clark 1500 loader was brought to a conclusion at a meeting on July 11, 1969, at Clark's facilities in Lubbock, Texas.

144. Exhibit 531 is an evaluation report (hereafter Texas report) prepared by Holtkamp for evaluating the Clark 1500 loader and was presented to management personnel of Clark and personnel of Melroe Manufacturing Company at the meeting in Lubbock on July 11, 1969. The Texas report includes comparative data of the Clark 1500 loader, Hancock Radial 500 (another Clark test machine), Melroe M-600 machine, Universal uni-loader, Owatonna Model 1000 loader and others.

145. On the afternoon of July 11, 1969, a competitive test

demonstration of the Clark 1500 loader, Hancock Radial 500 loader, Melroe loader, and Universal loader was conducted at Clark's facilities in Lubbock, Texas. Shortly after the meeting in Lubbock on July 11, 1969, Clark purchased Melroe Manufacturing and no further development or testing was done on the Clark 1500 machine.

146. The stanchions on the Clark 1500 machine were located intermediate the length of the machine and the pivot point of the lift arms was located forwardly of the seat. (Exhibit 528A). The location of the pivot point of the Clark 1500 machine is in approximately the same location as the pivot point on the Melroe M-400 machine.

147. During the competitive demonstrations at Lubbock, Texas, the Clark 1500 machine was found to be less stable than the Melroe loader with respect to the tipping load. It was also found that the Clark 1500 machine pivoted too much on the front axle in a loaded condition.

148. Steve Jacobson, an employee of Melroe Manufacturing Company in 1969, attended the demonstrations at Lubbock, Texas, on behalf of Melroe Manufacturing Company as an operator. Jacobson testified that he operated the Clark 1500 machine depicted in Exhibits 520A-520N and found it to be flatfooted with a tendency to tip forward.

149. Steve Jacobson testified that he attended a meeting on the morning of July 11, 1969, at the Clark facilities in Lubbock, Texas, and received a copy of the Texas report (Exhibit 531).

150. Steve Jacobson testified that during the course of the demonstration on July 11, 1969, he operated the Melroe Bobcat loader in competition with the Clark 1500 loader, Hancock Radial 500 loader, and Universal uni-loader. With the exception of straight ahead speed, Jacobson testified that the Clark 1500 loader could not perform competitively with the Melroe Bobcat machine.

151. The failure of the Clark 1500 machine as a satisfac-

torily operable skid steer loader resulted in the acquisition by Clark of Melroe Manufacturing Company.

Conclusions of Law

The Court concludes that in considering the most pertinent prior art and the allowed claims of the 117 patent, the subject matter of the 117 patent taken as a whole would not, at the time the invention was made, have been obvious to a person having ordinary skill in the art to which the subject matter pertains.

[16] The Court further concludes that a machine incorporating the elements of the 117 patent was "on sale" more than one year prior to the filing of the patent application, and pursuant to the provisions of 35 U.S.C. § 102(b), the patent is invalid.

117 Patent
Discussion of the Facts and Application of the Law

A. 35 U.S.C. § 102(b). The Validity Issue.

The evidence relating to the creation of the M-440 loader was to a great extent inconclusive, particularly in establishing the approximate date that each prototype was constructed and the date of sales activities that accompanied the development of the loader. Several key individuals in the M-440 development, including the co-patent holder of the 117 patent, Clifford E. Melroe, and the Minneapolis sales manager, Les Melroe, were not called to testify.

The development of the Melroe loader line was a remarkable breakthrough in the development of a small, relatively inexpensive, highly maneuverable four wheel drive self propelled loader that possessed broad utility in many areas.

When the Kellers joined the Melroe organization in September of 1958, Melroe Manufacturing Company, well known for its agricultural implements, had never had a loader line. By the mid-1960's the Melroe skid steer loader controlled over 50% of the small loader market in the world, a market essentially created by uniqueness and utility of the machine. It is clear to this Court the invention was unique, had utility and was not obvious.

Clark alleges that the claims of the 117 patent are invalid under 35 U.S.C. § 102(b) since a machine embodying the patentable invention was in public use or on sale more than one year prior to October 23, 1962, the date on which the application for the 117 patent was filed. The critical statutory bar date under 35 U.S.C. § 102(b) was October 23, 1961. Clark's proof of validity of the 117 patent under 35 U.S.C. § 102(b) rests with the alleged public use activity and public sale of Clark's predecessor company, Melroe Manufacturing Company. The alleged acts of early public use and sale by Melroe upon which Clark has relied are offers for sale of a machine incorporating the features of the 117 patent in late September or early October of 1961 to Midland Cooperative, Inc. of Minneapolis and Farmers Union Central Exchange of St. Paul, Minnesota, and an alleged public display of a machine incorporating the features of the 117 patent at the Minnesota State Fair in late August and early September of 1961.

[17] The statutory bar of 35 U.S.C. § 102(b) is invoked whenever the subject matter of the invention is in "public use" or "on sale" more than one year prior to the filing of the patent application. It is not necessary that the "patented product" be on hand in commercial quantities for it to be "on sale" within the meaning of § 102(b). In fact, it is only necessary the invention be "essentially" completed at the time of the invalidating sale. Exact identity between the product sold and the product described in the patent application is not required. Dart Industries Inc. v. E. I. DuPont DeNemours and Co., 489

F.2d 1359, 1364-65, 179 USPQ 392, 395-397 (7th Cir. 1973) cert. den. 417 U.S. 933, 182 USPQ 1 (1974).

1961 was a hectic year for Melroe. Judged by the standards of large manufacturing concerns, its operation lacked sophistication. The procedures in the development of the M-440 were quite haphazard. An idea was physically incorporated into a bench model before it was placed on a drawing board. If the bench model proved satisfactory, it was placed in a working model. Changes were continuous in the earlier model loaders as well as the M-440 line. In fact, after 1500 M-440 models were manufactured, enough changes had been incorporated to merit a new model number designation, the M-444. Melroe created sales by advertising and demonstrating a quality product for which there was a need.

In the summer of 1961, Melroe management was dissatisfied with its efforts in the loader field and were about to discontinue manufacturing them. The Kellers and the sales department were anxious to prove that a loader could be developed and sold that would be profitable to the company. The breakthrough on the problems associated with the M-400 loader came with the invention of the features embodied in the 117 patent. Kellers were extremely confident that they had solved the problems and Les and Sylvan Melroe were anxious to sell. It appears the sales activities anticipated the breakthrough and that contracts for the sale of machines embodying the elements of the 117 patent were in fact entered into prior to the § 102(b) bar date, which in this case was October 23, 1961. Delivery was set for later in 1961 and early in 1962.

Clark, through circumstantial evidence, has established by inference that the 440 loader was offered for sale to Farmers Union Central Exchange and Midland Cooperatives prior to the October 23, 1961, § 102(b) statutory bar date, and that orders for future delivery were taken from those two companies prior to October 23, 1961. The Court, with some hesitation, has given Clark the benefit of the inference. The hesitation arises

from the fact that the evidence is circumstantial. None of the parties directly involved in the sales were called to testify. No showing was made that they were unavailable. No explanation was given for the failure to call the witnesses. Admittedly, some of the documents relating to that period, and under the control of Clark, were destroyed by Clark. Further, Clark, with the documents available to it which it now relies on to invalidate the patent, and perhaps other documents not known to this Court, was able to successfully defend the validity of the same patent in the Owatonna lawsuit to the extent that Owatonna dismissed its action without prejudice, and took a sub-licensing agreement from Clark. All of the documents were under the control of Clark, and Kellers were not privy to them.

The evidence from which the inference of sales activities arise are copies of sale documents which are more specifically described in the following paragraphs of this Memorandum. The authenticity of the documents was established through witnesses who testified relative to the normal business practices being used at that time. Because there is no evidence in the record to rebut or explain the documents, the Court has given Clark the benefit of the inference and has found all of the 18 claims of the 117 patent have been rendered invalid by reason of the provisions of § 102(b). This finding is buttressed by the evidence of a September, 1961 press release, Exhibit 181.

The relevant documents relied on by Clark to indicate sales to the Farmers Union Central Exchange are:

(1) Exhibit 28, which is a Melroe Purchase Order, No. 13008, taken from the Farmers Union Central Exchange for three Model M-440 loaders with fertilizer buckets at $2,750.00 each;

(2) Exhibit 29, which is a Farmers Union Central Exchange Stock Purchase Order, No. S02947, dated October 4, 1961, for three loaders with fertilizer buckets at $2,750.00 each;

(3) Exhibit 30, which is a Melroe invoice, No. 40651, with an acknowledgement date of October 4, 1961, for three

Model 440 Melroe S.P. Loaders with fertilizer scoops at $2,750.00 each; and

(4) Exhibit 33, which is a bill of lading showing delivery of one 440 S.P. [an M-440 Bobcat] loader with fertilizer scoop to Farmers Union Central Exchange on 1-4-62.

From the exhibits and the testimony of witnesses Hull, Gehrman and Evjen, former Farmers Union employees, the inference arises that an offer of sale was made prior to the critical date.

The relevant documents relied on by Clark indicating sales to Midland Cooperatives are:

(1) Exhibit 12, which is a Melroe purchase order No. 001754 taken from Midland Cooperatives for 9 Model 440 loaders with fertilizer buckets for future delivery at different locations.

(2) Exhibits 13-19 inclusive, Melroe invoices No. 40556-40559 inclusive and 40561-40564 inclusive, each with different dates but each with an acknowledgement date of 9-30-61, and each covering the sale of an M-440 loader with fertilizer scoop, to Midland Cooperatives, Minneapolis, Minnesota, for delivery to seven of the locations indicated on Exhibit 12.

Melroe's former traffic engineer, Ardell Hansen, testified as to the procedures Melroe followed in processing orders by its salesmen. The testimony of Ora Alvin Messick, a former employee of Midland Cooperatives, was consistent with and corrobated the testimony of Hansen. The inference arises that the sales were processed prior to September 30, 1961.

1961 Minnesota State Fair

Clark has also alleged that Melroe displayed a Melroe loader embodying the patentable feature of the 117 patent at the Minnesota State Fair in 1961. The evidence surrounding this allegation, as seen in the Court's findings, is inconclusive and

contradictory. Equally credible witnesses testified to opposite facts. There was no substantial evidence that a Melroe loader embodying the features of the 117 patent was at the Minnesota State Fair in 1961.

Cyril Keller denied the presence of a new loader at the 1961 Fair. Exhibit 434 and 434A show four M-200 and M-400 type loaders on display. Both Sylvan Melroe and Cyril Keller identified the slide and photograph as a scene at the Minnesota State Fair.

Robert Christopher and Charles Brown, both former employees of the advertising firm of Gould, Brown and Bickett, testified as to the presence of an M-440 loader at the Fair and more importantly as to the advertising activity relating to this new loader. The fact that these advertising men had no pictures of the 440 loader they "saw" at the Fair causes the Court to discount their testimony.

Sylvan Melroe denied the existence of an M-440 loader at the Fair; however, in a letter dated August 25, 1961, to M. K. Reusch of Fergus Falls, Minnesota, he gave a general description of the so-called new loader. (Exhibit 497). The letter has a postscript that the "M-440" will be on display at the Minnesota State Fair. The Court concludes that Melroe intended to display a 440 loader at the Fair, but for some reason did not.

B. 35 U.S.C. § 103. Validity Issue.

Scope and Content of Prior Art

[18] The law in the Eighth Circuit, as it is in other jurisdictions, is that the presumption of validity is rebuttable and can be weakened, "if not completely destroyed," by Plaintiff's proof of pertinent prior non-considered art." American Infra-Red Radiant Co. v. Lambert Industries, Inc., 360 F.2d 977, 989, 149 USPQ 722, 730, 731 (8th Cir. 1966). Clark asserted the following as "pertinent prior non-considered art"

of the 117 patent.

(a) The preproduction "Bobcat" loaders used as demonstrators;

(b) The M-400 Melroe loader; and

(c) The Bailey (Exhibit 82); Schreck (Exhibit 85); LeTourneau (Exhibit 351); Zeider (Exhibit 352); Voss (Exhibit 353); Walstrom (Exhibit 354); Garrett (Exhibit 355); LeTourneau (Exhibit 356); Gerst (Exhibit 357; and Burrus (Exhibit 358).

[19] The Supreme Court in Graham requires under § 103 a factual inquiry into the scope and content of the prior art. Clark's expert, Hobbs, admitted that on the basis of the patents cited and relied on by the Patent Office, "it was proper in allowing the claims over the prior art . . . ." However, the expert and Clark contend that there was uncited prior art which would render the subject matter of the 117 patent obvious and therefore invalid. The Court has concluded that Clark failed in its effort to show that more pertinent prior art existed.

Non-Cited Patents

The testimony of Hobbs, Clark's expert, related specifically to a comparison of the details of each alleged pertinent, non-cited art, with the claims and features of the 117 patent, and then concluded generally that the non-cited prior art was more pertinent than the patents cited and relied upon by the Patent Office. Keller's expert, Barnes, made direct comparisons of the features of the non-cited prior art, said to be significant by Hobbs, with the corresponding features of the cited prior art. (Exhibits 550-560). The Barnes comparisons demonstrate that the non-cited prior art relied on by Clark is no better prior art than the art cited by the Patent Examiner, and would be cumulative with respect to the validity issue of the 117 patent (See Findings 132-137 on the 117 patent). Clark, having raised

the issue of patent invalidity, has the burden of overcoming by "substantial evidence" the presumption of patent validity. Woodstream Corporation v. Herter's 446 F.2d 1143, 1155, 170 USPQ 380, 388, 389 (8th Cir. 1971). In comparing the non-cited allegedly more pertinent patents to the claims of the 117 patent, Clark has failed to meet its burden. There is an admission that based solely on the cited art, the Patent Office was correct in allowing the 117 patent. Clark failed to show specifically how the non-cited, allegedly more pertinent patents are more pertinent than the patent art cited by the Patent Office.

The M-400 Loader

Clark argues the M-400 was prior art, because it was both "on sale" and "publicly used" within the United States more than one year prior to the filing of the application which led to the 117 patent. It is Clark's assertion that the M-400 met all elements of the 18 claims of the 117 patent except those aspects which relate to enclosed side compartments for carrying liquid supplies, stub axles, and rotary cam actuators for the clutches.

Going one step further, Clark argues that since the M-400 meets all elements of the 18 claims of the 117 patent except enclosed side compartments, stub axles and the rotary cams to activate the clutches, a § 103 determination is met since these differences are obvious in view of Bailey and Garrett.

Here again, neither of Clark's expert witnesses, Hobbs or Thomte, offered any testimony as to why the M-400 machine, as embodied in Exhibit 155, was better prior art than the prior art of record. In addition, there was evidence in the file wrapper (Exhibit 323) that promotional material was supplied to the examiner. A logical inference might be that M-200, M-400 literature was included. The M-400 lacks the most material elements of the 117 patent and according to Keller's expert,

Barnes, would have been merely "cumulative reference" for the elements it did contain. It lacked specifically the combination of elements and their structural relationship as set out in Claim 9 relating to the vehicle's body and the material handling members. Nor does the M-400 contain the elements of Claim 10, which relate to the enclosed side compartments. The M-400 side panels were not designed to contain or provide a receptacle for liquid supplies required in the operation of the vehicle. The position of the stanchions are substantially different than the placement as depicted in the 117 patent. The M-400 also fails to contain the elements of Claim 11 relating to the structural load supporting side compartments of the vehicle, in addition to the axle features and threaded actuating system as set out in Claim 1 of the 117 patent.

The Garrett patent (Exhibit 355) is alleged by Clark to be prior art to elements of the 117 patent relating to enclosed side compartments. However, Clark offered no proof that Garrett was better prior art than Leedom (Exhibit 334), which was cited by the Patent Office. The side compartments as described in Leedom are better prior art to the claims of the 117 patent than Garrett. The step from Leedom to the claims embodied in the 117 patent are not obvious pursuant to § 103 as even Clark would admit.

In its attack on Claims 1-8, 15, 16 and 18 of the 117 patent under 35 U.S.C. § 103, Clark relies on the testimony of its expert witness, Hobbs, who testified that rotary clutch actuators disclosed in the Bailey patent (Exhibit 82) could be substituted for the slide bar cam in the M-400 machine. The anticipatory structure constructed from the combination of the M-400 and the Bailey patent would not produce the rotary threaded clutch actuators of the 117 patent. Clark's expert witness, Hobbs, purported to show by Exhibit 368 the progressive design a designer would follow in arriving at the rotary threaded clutch actuators defined in Claims 1-8, 15, 16 and 18. The testimony regarding this exhibit and the

progression described therein is hindsight. The Eighth Circuit stated in Woodstream Corp. v. Herter's, supra at 1156, "[t]he critical question under Graham is whether at the time of the invention the subject matter would have been obvious to one skilled in the art." Clark's expert testified that after a substitution of the Bailey clutch actuators in the M-400 structure was made, a designer would then solve the "problem" of "high-loading" on the clutch by

(1) increasing the area of the surface or
(2) increasing the number of surfaces.

Somehow, these statements by Clark's expert purport to be the explanation of how and why a designer would follow the progressive steps shown on Exhibit 368. Not only is there no indication in Bailey as to how one should solve the problem of highloading of the clutches, but there is no mention of high-loading as being a problem with the clutches in the Bailey patent.

Louis Keller, the only person who tested both the Gravel Pit machine and the third prototype machines, testified that the problem associated with the slide bar cams clutch actuator in these machines involved binding of the slide bar actuator with the associated tank wall. Keller testified that the warping of the walls of the side compartments resulted from welding. Since the problem of highloading of the clutches is not present in the Gravel Pit machine, the third prototype, and the Bailey patent reference, this problem appears to be one created in the mind of Clark's expert, Hobbs. If the skill of the designer is needed to redesign the Bailey actuator (as expert Hobbs proposes) in order to arrive at the rotary threaded clutch actuators, then it is not a *combination* of the M-400 and Bailey patent which Hobbs contends will meet the terms of Claims 1-8, 15, 16 and 18.

[20] It is clear from the testimony of Clark's expert witness, Hobbs, and the other evidence offered by Clark that the M-400 machine and the Bailey patent reference in combination do not disclose the elements of Claims 1-8, 15, 16 and 18. If Clark's

presentation is believed, the combination of the M-400 machine and the Bailey actuators would produce a hypothetical structure having clutch problems. The skill of a designer would then be needed to solve the problems which this combination produced. Thus, a gap remains in Plaintiff's attack on validity of the 117 patent under 35 U.S.C. § 103 since the proposed anticipatory combination would merely be a starting point from which a *skilled designer* would experiment.

The structural features recited in claims 10-14, along with claims 15 and 18 of the 117 patent, provide the functional advantage of the 70-30% weight distribution with respect to the front and rear axles of the loader embodied in the 117 patent. The loader disclosed in the 117 patent contains the features of the Melroe M-444 loader and therefore has the 70-30% weight distribution with respect to the front and rear axles. This 70-30% weight distribution is also touted by Plaintiff in its literature (Exhibits 436, 437) as a critical factor in accomplishing satisfactory performance. It is the 70-30% weight distribution which permits maneuvering and skid steering of the machine embodied in the 117 patent.

The weight distribution of the M-400 machine with respect to the front and rear axles is approximately 55-45%. This produces a flatfooted condition in the M-400 and it is difficult to cause the M-400 to skid steer or pivot about its own axis. It is the weight distribution of the machine disclosed in the 117 patent that is critical to its operation, and weight distribution is inherent in the structural features recited in claims 10-14, 15 and 18. Although the 70-30% weight distribution is not expressly stated in the specification of the 117 patent, the features set forth in claims 10-15 and 18 do recite structural features which provide this inherent function. The critical nature of a difference (over the prior art) need not be expressly in the specification as long as the evidence shows that it is in fact critical.

If the M-400 was modified in the manner proposed by Clark's

expert, the closing of the side compartments would not provide compartments which extend throughout the length of the vehicle and which define the engine space as called for in Claims 10-14 and 18. Therefore, the functional advantage which inheres in these claims would not be present in the anticipatory structure. Plaintiff has failed in its burden to prove by substantial evidence that Claims 10-15 and 18 are invalid under 35 U.S.C. § 103.

The "Bobcat" Demonstrators

Clark alleges both the Third Prototype and the Fourth Prototype were prior art to the claims of the 117 patent. The Court has concluded that the Third Prototype was experimental and not in "public use" or "on sale".

The Fourth Prototype did contain the basic features of the 117 patent and substantial evidence was offered to show that prototype was in "public use" or "on sale" within the United States more than one year prior to the filing of the application which led to the 117 patent. The Court has found the 18 claims of the 117 patent invalid for this reason.

Aside from the invalidating exposure of the Fourth Prototype, the 18 claims of the 117 are non-obvious within the meaning of 35 U.S.C. § 103.

Secondary Considerations

The secondary considerations mentioned in Graham and present in this case, attest to the nonobviousness of the 117 patent. Clark, with all its resources and expertise, failed in its efforts to build a competitive loader. The commercial success of the "Bobcat" attests to the long felt but unsolved need for the highly maneuverable self propelled skid steer loader that arose out of the 117 patent. Clark has failed to show by substantial evidence that the claims of the 117 patent are invalid under any

provision of the law other than § 102(b).

254 Patent
The Evidence, Findings and Conclusion

1. U.S. Patent No. Des. 195, 254 was issued to Louis J. Keller, Cyril N. Keller and Clifford E. Melroe on May 21, 1963. The 254 patent is entitled "SELF-PROPELLED LOADER".

[21] 2. The application for the 254 patent was filed on July 25, 1962. Accordingly, the critical statutory bar date under 35 U.S.C. § 102(b) is July 25, 1961. (The 254 patent was received in evidence as Exhibit 385 and is attached in the appendix to this Memorandum. The Patent Office record of the 254 patent is Exhibit 387).

3. The claim of the 254 design patent is for "The ornamental design for a self-propelled loader, as shown and described." The loader design as claimed in the 254 patent is shown in its entirety in Figures 1 through 7 portraying the loader in side, rear and front perspective, top, front and rear views.

4. The only design considered and applied by the Patent Office was U.S. design patent No. 191,506 (Exhibit 386), an earlier patent granted to Louis Keller for the machine mechanically patented in the 503 patent.

Issue of Validity of the 254 Patent Under 35 U.S.C. § 102(b)

5. Clark alleges the overall configurations of the front end loaders depicted in the following exhibits: 130, 131, 132, 208, 236, 237, 238, 239, 282, 283, 288, 289, 376, 377, 379, 380, 381 and 382 are more pertinent in terms of relevant prior art to the 254 design patent than is the configuration disclosed in the cited Keller 506 design patent (Exhibit 386). Exhibits 130, 131 and 132 were identified as photographs of the Gravel Pit machine, or the second prototype, by Orval O'Neil, a Melroe

engineer. Exhibits 236, 237, 238, and 239 purport to be photographs of a front end loader used by John Sayers for demonstration purposes prior to the July 25, 1961, critical date. Exhibits 282, 283, 288 and 289 were identified by Arnold Van Winkle as photographs of a frontend loader he owns. Exhibits 376, 377, 379, 380, 381 and 382 were all identified by Louis J. Keller as photographs of the Gravel Pit Loader. Exhibit 208 is a duplicate of Exhibit 376 which John Sayers testified Louis Keller gave him prior to July 25, 1961, and which he used to promote and sell the Melroe loader line.

6. Exhibits 282, 283, 288 and 289 are photographs of a reconditioned M-400 loader.

7. The factual background relating to the development of the early, pre-production versions of the four wheel loader machine leading to the production and marketing of the loader depicted in the 254 design patent is set forth in detail under the preceding Findings of Fact relating to the 117 patent, and in particular to the 35 U.S.C. § 102(b) validity issue concerning that patent. Findings 9-30 of the preceding 117 patent Findings of Fact are also applicable to the 254 patent.

8. The second prototype, or the Gravel Pit Loader as described in preceding findings relating to the 117 patent, is alleged by Clark to have been "publicly used in such a way in operations at the gravel pit outside of Gwinner, North Dakota, and in the course of transporting it to, and using it at, Cyril Keller's home in Rothsay, Minnesota, on the weekend of July 4, 1961, so as to invalidate the '254 design patent." The Gravel Pit loader, or the second prototype is depicted in photograph Exhibits 130-132, 375-384 and 430-443 and their corresponding slides.

9. The Gwinner gravel pit is located in a rural area outside of Gwinner, North Dakota.

10. The Gravel Pit loader was a preproduction model of the "Bobcat" loader which is portrayed in the 254 patent. This prototype was an experimental model driven and tested almost

exclusively by Louis Keller at the Gravel Pit at Gwinner, North Dakota.

11. During the gravel pit testing, the second prototype remained in the control of inventors named in the 254 patent.

12. The Gravel Pit loader was never "on sale" within the meaning of subsection (b) of Section 102 of the Patent Act. There was no activity which would constitute "sale" or "offer for sale" by the inventors or their company or commercial exploitation.

13. There is no showing that any member of the public other than Melroe employees or their families was ever invited to attend and witness operations of the second preproduction machine at the gravel pit test site outside of Gwinner, North Dakota, prior to July 25, 1961. The only evidence of the possibility of other persons being at the gravel pit during the test operations of the second experimental loader prior to July 25, 1961, are the photograph exhibits 132, 383 and 384 showing the second pre-production, experimental loader dumping gravel into a truck. The drivers of the trucks may have been Melroe employees or employees of the City of Gwinner. There is evidence that some of the gravel dug at the Gwinner gravel pit by the second pre-production loader may have been disposed of by being spread on the streets of Gwinner, North Dakota, but this does not constitute activity amounting to commercialization of this second test machine.

14. The last of the series of experimental pre-production loaders was built for a final check out of tooling for production line manufacturing of the Bobcat loader depicted in the 254 design patent in the fall of 1961. The manufacture of the Bobcat loader did not commence until the end of November or December, 1961.

15. Louis Keller took the gravel pit loader from Gwinner, North Dakota, to his brother's home in Rothsay, Minnesota, on the weekend of July 4, 1961, in a pickup truck and returned to Gwinner with the loader on the day following the July 4, 1961,

holiday weekend. The basic intent of the Kellers in operating the gravel pit experimental loader on the July 4, 1961, weekend in excavating work at the home of Cyril Keller in Rothsay, Minnesota, was to test the loader under different operating and working conditions than those encountered at the Gwinner gravel pit. Digging and handling clay, earth and rock in this excavation operation imposed different loads on the loader than the Gwinner gravel pit. The Kellers wanted to test the loader under such operating conditions.

16. The operation of the gravel pit loader in the excavating work in Rothsay, Minnesota on the July 4, 1961 weekend did result in damage to the bucket lift arm structure. The lift arms were repaired the same weekend and the blackened areas on the lift arm structure in Exhibits 375, 376 and 433 show this welding repair.

17. There is no evidence that any member of the public outside of the Keller families was invited to, or witnessed, the loader excavating work at Cyril Keller's Rothsay home on the weekend of July 4, 1961.

18. The operation of the second, or gravel pit, experimental loader at Cyril Keller's Rothsay home on the weekend of July 4, 1961, and its transportation between Gwinner and Rothsay at that time was incidental to a test and experimental program on the gravel pit loader depicted in Exhibits 130-132, 430-433 and 375-380 which probably continued at the Gwinner gravel pit beyond July 25, 1961, the critical date with respect to the 254 patent.

19. Other early model M-200 and M-400 Melroe loaders were also used by the Kellers the weekend of July 4, 1961, in the excavation work at Cy Keller's Rothsay home.

20. There were changes made in the design of the gravel pit loader as reflected in the subsequent experimental loader (Exhibits 133-136), and in the final design of the commercial Bobcat loader shown in the 254 patent. These changes are evidenced by the different width and shape of the loader lift

arms, the different ornamental design of the rear grill, the different appearance of the crossbeam support structure between the rear, upright booms on the loader when viewed from the rear, as indicated by a comparison of these features on photograph Exhibits 130-132, 431, 133-136 and design patent Exhibit 235.

21. The design of the loader as depicted in the 254 design patent did not become final until the final checkout for tooling just prior to production in the late fall of 1961, well beyond the July 25, 1961 statutory bar date.

[22] 22. The Kellers experimental use of the Gravel Pit loader was done in good faith, which use, within the meaning of § 102(b), is not public use.

23. Clark introduced testimony through its witness, John Sayers, that he had in his possession and demonstrated one of the so-called new "white", pre-production loaders in July, 1961. This statement is not corroborated by any documentary evidence nor is it corroborated by the testimony of any other witness. Moreover, Exhibit 233, a bill for welding done on Sayers' demonstration machine, dated July 13, 1961, discloses the welding was performed on a bucket for a M-400 machine from which an inference clearly arises that the machine in Sayers' possession was not one of the pre-production M-440 loaders. Further, Sayers did not produce any document or recall any event to confirm his alleged recollection that he had one of the pre-production models of the Bobcat loader in his possession and was demonstrating it prior to July 25, 1961. In reference to "blowing a pump" on his alleged white demonstrator loader, he admitted this "would be the last part of July". Sayers' testimony is not consistent with other evidence in the case. In general, the testimony of Sayers was vague and unconvincing. The evidence is not sufficient to support a finding that Sayers had in his possession and publicly demonstrated a loader embodying the design features of the loader depicted in the 254 patent prior to July 25, 1961.

Consequently, no significance can be attached to photograph Exhibits 236, 237, 238 and 239.

24. The relevancy and weight of Exhibit 208 is also diminished by the contradictory evidence relating to that photograph.

Issue of Validity of the 254 Patent Under 35 U.S.C. § 103.

25. Clark contends that the combination of elements as embodied in the 254 configuration does not create a new or totally different design than that of the M-400 machine as shown in Exhibits 282, 283, 288 and 289. Further, Clark argues, the M-400 prior art demonstrates that the overall appearance of the configuration embodied in the 254 patent is an evolution of a design which would be obvious to an ordinary designer in the art.

26. Certain elements of the design embodied in the 254 patent were dictated equally by functional considerations as well as aesthetic appeal.

27. The appearance of the M-400 loader more clearly approximates the earlier model Melroe loader depicted in the cited 506 patent reference than the Bobcat loader depicted in the 254 patent. The primary difference in these two pieces of prior art is the four wheels of the M-400 loader as shown in Exhibit 287.

28. In comparing the visual impacts of the M-400 loader, with the Bobcat loader depicted in the 254 patent, the total visual impact is distinctively different, rather than similar. The differences are as follows:

(a) Photograph Exhibits 281 and 288 of the M-400 loader and Figures 1 and 2 of the 254 design patent, disclose a significant dissimilarity between the loaders. This results from the combination features including the horizontal top surface of the side panel in the 254 design patent compared

to the inclined side panel of the M-400; the horizontal position of the boom lift cylinder in Fig. 1 of the 254 patent compared to the downwardly angled position of the comparable lift cylinder in Exhibit 288 with the booms in a down position; the straight, upright rear stanchions on the loader of the 254 patent compared with the forwardly inclined rear stanchions of the M-400 as shown in Exhibit 288, and the resulting more rearward position of the pivot point between the stanchion and the lift booms of the 254 design as compared to the pivot point location on the M-400 shown on Exhibits 281 and 288. Further comparing Figs. 1 and 2 of the 254 patent with photograph Exhibits 281 and 288, the side silhouette of the M-400 loader shown in the photograph exhibits imparts an overall impression of a triangular shape in which the height of the machine is emphasized, with the downwardly and rearwardly inclined side panel giving an illusion of additional height. The greater length of the rear stanchions on the M-400 in comparison with the shorter stanchions shown in the 254 design patent resting on the top-rear side panels give the M-400 the appearance of a taller machine. The M-400 depicted in the photograph exhibits has an appearance of being taller and more compressed in a fore and aft direction from the side silhouette as shown in Exhibit 288, in comparison with the loader design in Figure 1 of the 254 patent which appears to be longer in the horizontal direction. Also, comparing these same exhibits, the rear end of the M-400 in Exhibits 281 and 288 is very different. This is due to the open, rear engine cage depicted on these two photograph exhibits of the M-400 with radiused or curved rear engine guards, in comparison with the rear end design of the loader shown in Figs. 1 and 2 of the 254 patent wherein the elongated, horizontal side panels extend all of the way to the rear end of the vehicle to provide a fully solid, enclosed rear engine compartment as viewed from the side.

(b) In comparing the rear ends of the loaders shown in Fig. 3 of the 254 patent and in Exhibit 283, the rear end portions of the two designs are strikingly different. This is due to the fully enclosed, squared-off rear end of the loader shown in Fig. 3 of the 254 patent in comparison with the open rear end of the M-400 shown in Exhibit 283 with rounded protective bumper bars.

(c) The front of the loaders as viewed in the perspective view of Fig. 4 of the 254 patent and in Exhibit 373, shows more of a U-shape on the 254 loader design in comparison with an H-shape on the M-400.

(d) Comparing Fig. 4 of the 254 design patent with Exhibit 373, the absence of any cross member across the front end of the loader design of the 254 patent creates a visual impression of a more open front end.

(e) Comparing the rear end view of the loader design of the 254 patent as shown in Figure 7, Exhibit 385, with the rear end of the M-400 as shown in Exhibit 285, reveals a different visual impact overall. This is due to the ornamental rear grill and the elevated crossbar between the rear stanchions on the 254 design as compared to the open, rear engine cage on the M-400 without a crossbar.

(f) The view of the front end of the M-400 depicted in photograph Exhibit 286 differs significantly from the view of the front end of the 254 patent depicted in patent Figure 6, Exhibit 385. This is due to the fully open front end on the 254 loader design, with no cross member being present, and to the use of two horizontally spaced bucket tilt cylinders as compared to the single large tilt cylinder shown in the middle of the M-400 loader in Exhibit 286.

29. The 254 patent is nonobvious in the sense that it conveys an aesthetic effect substantially different from previous.

[23] 30. The impact on an ordinary observer can be relevant to determining novelty with respect to design. How-

ever, there is no substantial evidence in the record that ordinary observers could not readily distinguish between the M-400, and the subsequent Bobcat loader covered by the 254 patent.

Ultimate Findings and Conclusion of Law

The operation of the second prototype or the Gravel Pit machine, at the gravel pit test site of Melroe near Gwinner, North Dakota, prior to July 26, 1961, was experimental and was not a commercial public use within the meaning of 35 U.S.C. § 102(b).

The operation of that same machine at the basement excavation of Cyril Keller's home in Rothsay, Minnesota, and the transportation of the loader between Gwinner, North Dakota, and Rothsay, Minnesota, on the weekend of July 4, 1961, was incident to, and part of, a continuing test program on this loader, and was not a public use within the meaning of 35 U.S.C. § 102(b).

There is no substantial evidence to support a finding that John Sayers had in his possession and publicly demonstrated a loader embodying the design features of the loader depicted in the 254 patent prior to July 26, 1961. There is no credible evidence that Sayers had in his possession and showed to potential customers sales literature disclosing the design of the loader covered by the 254 patent prior to July 26, 1961.

Clark has failed to meet its burden of proof to overcome the presumption of validity attaching to the 254 patent, and has failed to prove the 254 patent is invalid under 35 U.S.C. § 102(b) or § 103.

254 Patent
Discussion of Facts and Application of the Law

Clark relies heavily on the alleged "public use" and "public sale" activities by Sayers prior to the critical date of July 25, 1961, to attack the validity of the 254 patent. The Sayers' testimony is uncorroborated and to a great extent even contradicted by other Clark witnesses.

Exhibit 208 was a picture of the Gravel Pit loader and was purportedly given to John Sayers by Cyril Keller and displayed to potential customers prior to July 25, 1961. Cyril Keller denied making prints from the slide he took and denied having given Sayers the photograph. The slides taken on the 4th of July weekend in Rothsay were given to Melroe for use in the Universal and Owatonna lawsuits, and to Clark when it was substituted for Melroe as a defendant in the Owatonna lawsuits. The slides were never returned to the possession of the Kellers. The receipt of Exhibit 208 in evidence has no probative value except as a duplicate of Exhibit 376 which Louis Keller was able to identify with specificity. Exhibit 208 and the testimony relating to it does not support a conclusion that Sayers had the photograph in his possession and displayed it to members of the public prior to July 25, 1961.

The testimony of John Sayers relating to his alleged use of a "white" prototype as a demonstrator prior to July 25, 1961, has been discussed in reference to the 117 patent.

Sayers also testified that he had the sale brochure identified as Exhibit 224 in his possession and showed it to potential customers prior to July 25, 1961. More than one witness, including Robert Christopher of Gould, Brown and Bickett, testified positively that the tradename "BOBCAT" was not even conceived of by the advertising firm until *after* the Minnesota State Fair in 1961. It is simply not possible that Exhibit 224, with the BOBCAT name appearing on it could have been

printed and available for distribution prior to the July 25, 1961 critical date. The testimony of John Sayers lacked credibility.

35 U.S.C. § 102(b) Issue Regarding Validity of the 254 Patent.

Section 171 of Title 35 of the United States Code states:

"Whoever invents any new, original and ornamental design for an article of manufacture may obtain a patent therefor, subject to the conditions and requirements of this title.

The provisions of this title relating to patents for inventions shall apply to patents for designs, except as otherwise provided."

[24] It is clear from the language of Section 171 that the § 102(b) "public use" and "on sale" activities are available to invalidate a design patent.

Clark's attack under § 102(b) relates principally to the existence of the so-called Gravel Pit loader and its use and operation at the Gwinner gravel pit and at the basement excavation project of Cyril Keller in Rothsay, Minnesota, prior to July 25, 1961. The Gravel Pit machine in all major respects did disclose the 254 patent configuration. Although there is no requirement that design be reduced to practice to be patentable, in this case the Gravel Pit machine was a functional machine embodying the 254 design configuration.

In 1961, the Melroe organization operated a small and unsophisticated manufacturing company. An informal testing program might be totally unacceptable to Clark, but was part of Kellers' and Melroe's style during this development period. There is no evidence of anything but good faith on the part of the Kellers in the testing of the Gravel Pit loader.

The Kellers maintain that all activities relating to the Gravel Pit loader were experimental in nature. Clark, on the other hand, seems to argue that "experimental use" is not a defense available to Keller with respect to the 254 patent.

"Insofar as the public disclosures of the 254 design configuration is concerned 'experimental use' is unavailable to Kellers to excuse or justify 'public use' prior to the critical date. It is axiomatic in determining validity that each patent must stand alone. Thus, while the utilization of the loader at the gravel pit may potentially be 'experimental' in connection with the 117 mechanical patent, it has no relevancy to the 254 design patent. The record is barren of any evidence that public disclosures of the overall configuration of the gravel pit loader had anything at all to do with the 'testing' members of the public as to the overall ornamental impact of the design." Clark Post Trial Brief at 41-42.

The Court is unable to accept Clark's reasoning as logical. First, Clark has pointed out design patents are subject to the same tests of patentability as mechanical patents and presumably have the same defenses. And second, in this case, the design features are directed to the external configuration of the loader essentially in the form of a body for housing and supporting the various mechanical and structural elements. The good faith testing of an experimental loader would unavoidably involve changes in the final design or external appearance as well as the mechanical aspects of the loader as determined by test results.

[25] The emphasis on "public use" is use for profit and commercial exploitation. Use of an invention for experimental purposes is not public use if it is conducted in good faith for the purpose of testing the qualities and for no other purpose not naturally incident to that. In re Yard Processing Patent Validity Litigation, 498 F.2d 271, 277, 183 USPQ 65, 68, 69 (5th Cir. 1974) cert. denied 419 U.S. 1057, 184 USPQ 65; Dunlop Co., Ltd. v. Kelsey-Hayes Co., 484 F.2nd 407, 413, 179 USPQ 129, 133 (6th Cir. 1973) cert. denied 415 U.S. 917, 181 USPQ 1; Pickering v. Holman, 459 F.2d 403, 406, 173 USPQ 583, 584 (9th Cir. 1973); Magnetics, Inc. v. Arnold Engineering Co., 438

F.2d 72, 74, 168 USPQ 392, 394 (7th Cir. 1971); Cloud v. Standard Packaging Corp., 376 F.2d 384, 390, 153 USPQ 317, 321, 322 (7th Cir. 1967).

Good faith experimentation of the Gravel Pit loader continued from the Gwinner gravel pit to the Keller home in Rothsay. The design followed the mechanical aspects. Until the changes were made in the mechanical aspects of the loader found necessary by testing, then the design was left in abeyance. Clark's own legal expert, Tompke, testified a design could be patented even though aspects of the design had functional considerations as well as aesthetic appeal. In this case, the design change in the boom arms after the Fourth of July testing is an example of a design directed toward function and aesthetics.

The record demonstrates that the complete design as embraced in the drawings of the 254 patent (Exhibit 385) was in all probability not finalized until the Melroe organization was ready to go into production with the M-440 loader. The record is clear that production commenced well after July 25, 1961.

[26] Clark proposes a very strict definition of "public use" which might better be described as "public disclosure". But the policy behind § 102(b) does not support such a strict interpretation nor does the evolving case law.

> "The Public Use Bar 35 U.S.C. § 102(b) provides that an inventor shall not be entitled to a patent if 'the invention was . . . in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.' The policy underlying this provision is very clear. It prevents an inventor from extending the period of his monopoly by exploiting his invention before his application for a patent. Pennock v. Dialogue, 27 U.S. (2 Pet.) 1, 19, 7 L.Ed. 327 (1829); Super Mold Corp. v. Clapp's Equip. Div., Inc., 158 USPQ 527, 528 (9 Cir. 1968), 397 F.2d 932, 933; Tool Research & Eng'r Corp. v. Honcor Corp., 151 USPQ 236, 241 (9 Cir. 1966), 367 F.2d 449, 454; Koehring Co. v.

National Automatic Tool Co. (7 Cir. 1966) 362 F.2d 100, 103, 149 USPQ 887, 889; Metallizing Eng'r Co. v. Kenyon Bearing & Auto Parts, 68 USPQ 54, 58 (2 Cir. 1946), 153 F.2d 516, 520, cert. den. 328 U.S. 840, 66 S.Ct. 1016, 90 L.Ed. 1615, 69 USPQ 631; Aerovox Corp. v. Polymet Mfg. Corp., 20 USPQ 119, 120, 121 (2 Cir. 1933), 67 F.2d 860, 862; Ushakoff v. United States (Ct. Cl. 1964), 327 F.2d 669, 672, 164 Ct.Cl. 455; Note, The Public Use Bar to Patentability: Two New Approaches to the Exception, 52 Minn. L. Rev. 851, 864-865 (1968).

A use which commercially exploits an invention constitutes a public use (i.e. either 'in public use or on sale'). The use may be exposed to the public or hidden. Hall v. Macneale, 107 U.S. 90, 97, 2 S.Ct. 73, 27 L.Ed. 367 (1882). Commercial exploitation of the product of a secret process or machine constitutes public use, regardless of whether the process or machine could have been known by familiarity with the product. Tool Research Eng'r Corp. v. Honcor Corp., 151 USPQ 237, 251 (9 Cir. 1966) 367 F.2d 449, 454; United States Chem. Corp. v. Plastic Glass Corp., 113 USPQ 303, 304 (3 Cir. 1957), 243 F.2d 892, 894; Huszar v. Cincinnati Chem. Works, 80 USPQ 466, 468, 469 (6 Cir. 1949), 172 F.2d 6, 10; Metallizing Eng'r Co. v. Kenyon Bearing & Auto Parts Co. (2 Cir. 1946), 153 F.2d 516, 520, 68 USPQ 54, 58 cert. den. 328 U.S. 840, 69 USPQ 631, 66 S. Ct. 1016, 90 L.Ed. 1615. A use which is primarily experimental and no more than incidentally for trade or profit is not a public use. E.g. Smith & Griggs Mfg. Co. v. Sprague, 123 U.S. 249, 88 S.Ct. 122, 31 L.Ed. 141 (1887). This is the so-called 'experimental use exception'. Viewed in light of the policy underlying the public use provision, however, it is no exception at all. A bona fide experimental use involves no commercial exploitation. 'The use [of an invention] ceases to be experimental when the motivation of the inventor is to exploit the invention and gain a competitive advantage over

others.' Solo Cup Co. v. Paper Mach. Corp., D.C., 240 F.Supp. 126, 131, 144 USPQ 729, 732, 733, quoted in Super Mold Corp. v. Clapp's Equip. Div., Inc., 158 USPQ 527, 528 (9 Cir. 1968), 397 F.2d 932, 933." Pickering v. Holman, 459 F.2d 403, 406, 173 USPQ 583, 584 (9th Cir. 1972).

[27] The challenged use of the Gravel Pit loader prior to July 25, 1961, clearly did not embrace the element of commercialization. The loader was never offered for sale or demonstrated to the public for commercial or promotional purposes. The use at the Gwinner Gravel Pit was acknowledged by Orval O'Neil, a Melroe-Clark engineer, as being part of a testing program. The gravel pit was the Melroe proving ground. The public was not invited, and there was no evidence of the public being present during the testing of the Gravel Pit Machine at the gravel pit. The same is true of the challenged use at Cyril Keller's Rothsay home on the weekend of July 4, 1961. During that weekend and during the transportation of the loader between Gwinner and Rothsay, Minnesota, the gravel pit machine was in the control of Louis and Cyril Keller, two of the patent holders of the '254 patent. The activity of the Gravel Pit loader with respect to the '254 patent does not come within the definition of public use proscribed by 35 U.S.C. § 102(b).

The Court also notes the case of International Silver Co. v. Julie Pomerantz, 271 F.2d 69, 72 (2nd Cir. 1959). The reasoning therein has applicability to the instant case and its holding with respect to the public use issue is directly contrary to Clark's "mere exposure" theory with respect to the application of 35 U.S.C. § 102(b) to design patents.

Impact of the M-400 on Novelty of the 254 Under 35 U.S.C. § 102

Clark does allege the 254 design patent lacks novelty in view of the M-400. The argument is that the M-400 loader design is so similar in overall configuration to the design of the 254

patent that the ordinary observer could not distinguish them, thus the patent lacks novelty.

The test of the "ordinary observer" may be relevant to determining novelty with respect to design; however, there is no substantial evidence in this record that ordinary observers could not readily distinguish between the M-400 and the subsequent BOBCAT loader covered by the 254 patent. The Court refers specifically to the sparse testimony of witnesses Steenhoven and Van Winkle.

35 U.S.C. § 103 Obviousness Issue Regarding the 254 Patent

[28] Clark alleges that the loader covered by the 254 design patent is obvious in view of the earlier M-400 Melroe loader. Again 35 U.S.C. § 103 must be applied against design patents in the same way as it is applied against utility patents, and the obviousness tests of Graham v. Deere, 383 U.S. 1, 148 USPQ 459 (1965) must be considered.

[29] Also applicable is the holding of the Eighth Circuit in Woodstream Corp. v. Herter's Inc., 446 F.2d 1143, 170 USPQ 380 (8th Cir. 1971). Therein, the Circuit indicated that in applying 35 U.S.C. § 103, the question of obviousness must be determined upon the particular facts of each case.

Because the Court has attributed no credibility to the testimony of John Sayers, Clark's challenge to the validity of the 254 patent under 35 U.S.C. § 103 rests on the M-400. No supplemental art or prior art teachings of any kind have been cited and relied upon by Clark with respect to the obviousness issue.

[30] A court in determining patentability of a design must rely both on its own visual impression as to whether the claimed design is novel in the sense of conveying aesthetic effect substantially different from previous art and also on the more objective reference point wherein the Court must consider

whether the new design reflects originality or was obvious at the time of the invention (design) to one skilled in the art. Fields v. Schuyler, 472 F.2d 1304, 1306, 175 USPQ 514, 515 (D.C. Cir. 1972) cert. denied, 411 U.S. 987, 177 USPQ 673 (1972).

The Court finds that the overall configuration of the 254 design involves a number of modifications and changes from the M-400 machine which do convey an aesthetic effect substantially different from that previous art. These design differences are set forth in detail in Finding No. 28 above under the 254 patent. Clark's expert design witness, Johnson, and Keller's expert, Barnes, both testified to the significance of the various design differences with respect to the ultimate and total visual impact on the observer.

[31] Obviousness, unlike the "average observer" test for novelty, continues to be measured by the skill of the "ordinary" designer. Clark has failed to carry its burden of proving invalidity by "substantial evidence". Woodstream Corp. v. Herter's Inc., supra at 1149, 170 USPQ at 384. It would be part of the burden of the party attacking the validity of the design to introduce some substantial prior art disclosing or suggesting the different features of the 254 loader design which are not embraced in the M-400 machine. No evidence was submitted and absent such a showing, there is no basis upon which to find the total loader design covered by the 254 loader patent is obvious in view of the M-400 machine alone. It is this combination of distinctive features which makes the Bobcat loader of the 254 patent a distinctive and nonobvious design in comparison with the M-400 machine. Designs must be considered in their entireties in determining the validity of design patents. Schnadig Corporation v. Gaines Manufacturing Co., Inc., 494 F.2d 383, 181 USPQ 417 (6th Cir. 1974). In that case, the Court stated:

> "In determining the validity of a design patent, it is the appearance of the article as a whole, the tout ensemble, that must be compared with the prior art, since it is the appearance that constitutes the contribution to the public. Gorham Co. v. White, 81 U.S. 511 (1871); Hadco Products, Inc., supra, at 1269, 174 USPQ at 361; Schwinn Bicycle Co. v. Goodyear Tire and Rubber Co., 444 F.2d 295, 168 USPQ 258 (9th Cir. 1970); Glen Raven Knitting Mills, Inc. v. Sanson Hosiery, 189 F.2d 845, 89 USPQ 470 (4th Cir. 1951)." 494 F.2d at 389.

Clark also argues there is not a single distinguishing feature of the 254 design as compared to the M-400 that is not the product of functional considerations and therefore the configuration of the 254 design cannot be patented. However, Clark did not offer testimony on this point.

[32] The particular functional considerations which went into the BOBCAT loader did not dictate the particular, external design configuration which resulted. For example, the elongated side compartments could have been given any shape along their top and bottom edges, other than that of a straight, horizontal line. Curved, triangular, or any kind of a slanted shape could have been utilized, as embraced in the so-called "Olson" preproduction loader. The weight distribution considerations, which were a factor is moving the upright stanchions more rearwardly, did not require that the stanchions extend straight, upright from mounting positions on top of the straight, rearwardly extending side compartments. The stanchions could have taken any shape, and inclined rearward or forward, and still, by being maintained in the rear, assist functionally in distributing more of the weight on the rear end of the vehicle. Clark's design expert, Johnson, acknowledged that the rear grill was strictly an ornamental feature. The open front end of the BOBCAT loader, while making it easier to enter and leave the loader, did not have to take on the particular clean, unobstructed and straight line appearance illustrated in Figs. 4 and 6 of the 254 patent. The loader design depicted in the 254 patent conveys an aesthetic impression. Design patentability is not defeated merely because the same machine has utility and

can support a utility patent. The same article or machine which embodies a utility invention may also be proper subject matter for a valid design patent. Anchor Hocking Corp. v. Eyelet Speciality Co., 183 USPQ 87, 377 F.Supp. 98 (D.C. Del. 1974). Accordingly, the requirement that a design, to be patentable, be basically ornamental, and not primarily dictated by functional considerations has been met in this case.

Assertion of Lack of Candor with the Patent Office.

Clark charges that each of the three patents should be invalidated on the grounds of failure of "complete candor with the Patent Office by the Kellers.

[33] A patent applicant has an "uncompromising duty" toward the Patent Office to disclose pertinent facts. In Precision Instrument Manufacturing Co. v. Automotive Maintenance Machinery Co., 324 U.S. 806, 65 USPQ 133 (1944), the Supreme Court stated:

> "Those who have applications pending with the Patent Office or who are parties to Patent Office proceedings have an uncompromising duty to report to it all facts concerning possible fraud or inequitableness underlying the applications in issue." 324 U.S. at 818, 65 USPQ at 139. See also, Beckman Instruments Inc. v. Chemtronics, Inc., 428 F.2d 555, 560, 165 USPQ 355, 359 (5th Cir. 1970).

The Sixth Circuit, in a case involving prior art that an applicant had failed to disclose, explained:

> "The Patent Office, not having testing facilities of its own, must rely upon information furnished by applicants and their attorneys. Pfizer and Cyanamid, like all other applicants, stood before the Patent Office in a confidential relationship and owed the obligation of frank and truthful disclosure." Charles Pfizer & Co. v. FTC, 401 F.2d 574, 579, 159 USPQ 193, 195, 196 (6th Cir. 1968).

The United States Court of Customs and Patent Appeals specifically acknowledged the "duty" in Norton v. Curtiss, 433 F.2d 779, 167 USPQ 532 (CCPA 1970), and commented:

> "In suits for patent infringement, unenforceability, as well as noninfringement or invalidity under the patent laws, is a statutory defense. See 35 U.S.C. § 282(1). We have noticed that unenforceability due to fraudulent procurement is a rather common defense. In such circumstances, we find that the courts are generally applying equitable principles in evaluating the charges of misconduct alleged to be fraudulent. Thus, in suits involving patents, today, the concept of 'fraud' on the Patent Office (at least where a patentee's conduct pertaining to the relative merits of his invention is concerned), encompasses not only that which we have earlier termed 'technical' fraud, but also a wider range of 'inequitable' conduct found to justify holding a patent unenforceable. The courts differ as to the conduct they will recognize as being sufficiently reprehensible so as to so as to carry with it the consequences of technical fraud. Nevertheless, one factor stands clear: the courts have become more critical in their interpretation of the relationship existing between applicants for patent and the Patent Office and their scrutiny of the conduct of applicants in light of that relationship. Not unlike those appearing before other administrative agencies, applicants before the Patent Office are being held to a relationship of confidence and trust to that agency. The indicated expansion of the concept of 'fraud' manifests an attempt by the courts to make this relationship meaningful." Norton v. Curtiss, 433 F.2d at 793, 167 USPQ at 543, 544.

[34] The Norton court also expressed the burden to be applied in cases wherein "fraud" is alleged:

"Because of the importance of this issue, the courts have demanded that the quantum of proof as to fraud be substantial. The standard has been and still is that proof of fraud must be clear and convincing. Thus, the one asserting misconduct carries a heavy burden of persuasion." Norton v. Curtiss, 433 F.2d at 797, 167 USPQ at 546, 547. See also Scott Paper Co. v. Fort Howard Paper Co., 432 F.2d 1198, 1204, 167 USPQ 4, 9 (7th Cir. 1970); Bendix Corp. v. Bolax, Inc., 421 F.2d 809, 819, 164 USPQ 485, 493, 494 (7th Cir. 1970).

Absent from the record in the instant case is "clear and convincing" evidence of fraud or lack of candor with the Patent Office by the Kellers in prosecution of the patents in this case.

[35] With respect to the 503 patent, Clark alleges the Kellers should have disclosed the existence of the original Veloloader to the Patent Office. The basis for this contention is that this early loader contributed prior art as a "public use" under 35 U.S.C. § 102(b). The Court has found that even if the Veloloader is considered prior use of the 503 patent, the use was experimental in nature. There would be no duty for a patent applicant or his attorney to disclose to the Patent Office prior use or sales to which there is a bona fide basis for believing the use was experimental.

[36] As the Court has also found, even if prior art, the Velo loader did not fully anticipate the claimed subject matter of the 503 patent. The first loader did not incorporate the claimed invention. There is no duty on the part of a patent applicant or his attorney to disclose to the Patent Office nonanticipatory prior art. Scott Paper v. Fort Howard Paper, 432 F.2d 1198, 1204, 1205, 167 USPQ 4, 9, 10 (7th Cir. 1970); Duff - Norton v. Ratcliff, 362 F.2d 551, 553, 150 USPQ 166, 167 (9th Cir. 1966).

With respect to the allegations of lack of candor with the Patent Office as to the 254 patent, the same legal and factual

considerations as noted above apply. The second preproduction loader, the Gravel Pit machine on which Clark is relying as an invalidating public use, was an experimental machine. Kellers acted in good faith in not disclosing the machine to the Patent Office.

Relative to the 254 patent, the Court has found the M-400 to be non-anticipatory prior art. For the reasons set forth in the Findings, the M-400 did not embrace the loader design covered by the 254 patent. The M-400 was no better prior art than the cited Patent No. 191,506, the design patent on the machine which incorporated the 503 patented transmission. It has not been proved that Kellers failed to act in good faith in the prosecution of the 254 design patent.

[37] The Court has found the 18 claims of the 117 patent invalid based on "prior sale" under 35 U.S.C. § 102(b). Any discussion of candor in the prosecution of this patent is moot. In any event, the Court is of the opinion the Kellers individually acted with the utmost candor in their individual participation in prosecuting the 117 patent.

Order for Judgment

The above entitled actions involve multiple parties and present multiple claims for relief. The Court has determined there is no just reason for delay in the entry of final judgment adjudicating the claim of Clark Equipment Company alleging that Patents 3,151,503; 3,231,117; and 195,254 are invalid.

It is ordered that final judgment be entered declaring Patent 3,231,117 to be invalid because the invention covered by the patent was on sale in the United States more than one year prior to the date of the application for the patent in the United States and further declaring that Clark Equipment Company has failed to prove its allegation that Patents 3,151,503 and 195,254 are invalid.

It is further ordered that the judgment to be entered pursuant to this Order involves a controlling question of law as to which there are substantial grounds for difference of opinion and that an immediate appeal may materially advance the ultimate termination of the litigation.

It is further ordered that if an appeal is taken, further proceedings in District Court in Case No. 4875 and Case No. 4839 are stayed until the determination of the appeal.

[Appendix omitted.]

APPENDIX C

Examination of Claims for Patentability Under 35 U.S.C. 103

The purpose of this notice is to inform the public of the current Patent and Trademark Office policy concerning determinations of obviousness under 35 U.S.C. 103 in view of the recent Supreme Court decision in *Sakraida* v. *Ag Pro* 189 USPQ 449 (1976).

The following text is a copy of a memorandum issued to all patent examining personnel relative to this topic.

"A clarification of the policy of the Patent and Trademark Office in the examination of claims for patentability under 35 U.S.C. 103 seems in order at this time in view of the Supreme Court's decision in *Sakraida* v. *Ag Pro*, 189 USPQ 449 (decided April 20, 1976) which is similar to the Court's earlier decision in *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co.*, 163 USPQ 673 (decided December 8, 1969).

"Office policy has consistently been to follow *Graham* v. *John Deere Co.*, 148 USPQ 459 (decided February 21, 1966) in the consideration and determination of obviousness under 35 U.S.C. 103. The three factual inquiries enunciated therein as a background for determining obviousness are as follows:

1. Determination of the scope and content of the prior art;
2. Ascertaining the differences between the prior art and the claims in issue; and
3. Resolving the level of ordinary skill in the pertinent art.

"Attention is directed to MPEP Section 706 for a more complete discussion of the application of the Graham test.

"The Supreme Court reaffirmed and relied upon the Graham three-pronged test in its consideration and determination of obviousness in the fact situations presented in both the Ag Pro and Black Rock decisions. In each case, the Court went on to

discuss whether the claimed combinations produced a 'new or different function' and a 'synergistic result,' but clearly decided whether the claimed inventions were unobvious on the basis of the three-way test in Graham. Nowhere in its decisions in those cases does the Court state that the 'new or different function' and 'synergistic result' tests supersede a finding of unobviousness or obviousness under the Graham test.

"Accordingly, examiners should continue to apply the test for patentability under 35 U.S.C. 103 set forth in Graham. It should be noted that the Supreme Court's application of the Graham test to the fact circumstances in Ag Pro is somewhat stringent, as it was in Black Rock."

July 8, 1976.

C. MARSHALL DANN,
Commissioner of Patents & Trademarks.

Supreme Court, U. S.
FILED
MAY 18 1978
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1977

No. 77-1640

CLARK EQUIPMENT COMPANY,
Petitioner

versus

LOUIS J. KELLER AND CYRIL N. KELLER,
Respondents

APPENDIX FOR
PETITION FOR A WRIT OF CERTIORARI TO THE
UNITED STATES COURT OF APPEALS FOR THE
EIGHTH CIRCUIT

JACK E. TOLIVER
Circle Drive
Buchanan, Michigan 49107

FRED E. SCHULZ and
Wildman, Harrold, Allen & Dixon
One IBM Plaza
Chicago, Illinois 60611

JOHN D. KELLY,
Vogel, Brantner, Kelly,
Knutson, Weir & Bye
P.O. Box 1329
Fargo, North Dakota 58102

Attorneys for Petitioner

APPENDIX INDEX

Title of Exhibit	Pages	Exhibit Number*
1. Keller et al Patent No. 3,151,503	1-4	53
2. Loyd Patent No. 1,623,929	5-10	84
3. Schreck Patent No. 2,336,642	11-18	85
4. Hellwarth Patent No. 1,470,078	19-25	86
5. White Patent No. 2,936,840	26-35	75
6. Butler Sketch	36	100

*Trial exhibit numbers are used in the District Court's opinion appearing in Appendix B.

Oct. 6, 1964 L. J. KELLER ETAL 3,151,503

TRANSMISSION SYSTEM

Filed Dec. 1, 1958

FIG. 1

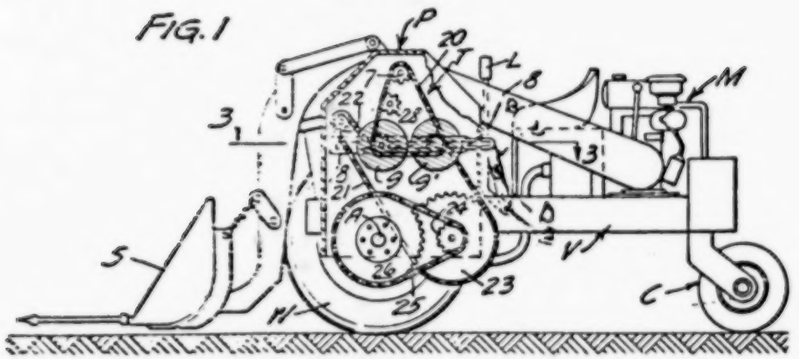


FIG. 2

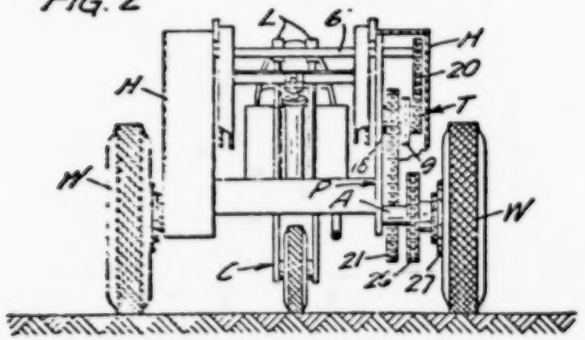


FIG. 3

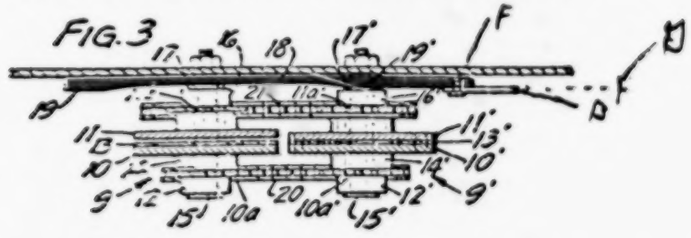


FIG. 4

INVENTOR
LOUIS J. KELLER
CYRIL N. KELLER
BY Williamson, Schroeder & Talmadge
ATTORNEYS

Ex 53
CLARK

United States Patent Office 3,151,503 Patented Oct. 6, 1964

3,151,503

TRANSMISSION SYSTEM

Louis J. Keller and Cyril N. Keller, Roseau, Minn.

Filed Dec. 1, 1958, Ser. No. 777,268
4 Claims. (Cl. 74—722)

This invention relates to systems for transmitting driving power from a power unit to propulsion wheels, drive shafts and the like, and in particular to a transmission system for self-propelled vehicles having independently rotatable propulsion or drive wheels.

An object of our invention is a transmission system for self-propelled wheeled vehicles such as tractors, loaders, sweepers and the like, which imparts maximum maneuverability to such vehicles.

Another object is a transmission system for each wheel which permits the wheel to be independently driven forwards or backwards or idled as desired.

Still another object is a selective (forward, reverse, neutral drive) transmission system for each independent propulsion wheel for differential driving of the wheels which enable a pair of wheels so equipped to serve not only as the driving mechanism but also as the steering mechanism, the transmission system being particularly adaptable to vehicles having two independent propulsion wheels and a caster or swivel wheel for maneuverability.

A further object is a selective transmission system for an independent propulsion wheel in which the direction or nature of the driving force is altered by a shifting bar whose movements are controlled by a single simple control lever in the cab of the vehicle.

A still further object is a transmission system for an independent propulsion wheel which combines a clutch adapted for forward drive with a clutch adapted for reverse driving in the same system and means for engaging either of said clutches for drive operation or permitting both clutches to disengage causing idling of said wheel.

These and other objects and advantages of our invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a side elevational view of a loader vehicle for employing the transmission system of our invention with portions thereof broken away for clarity of detail as an aid to understanding;

FIG. 2 is a front elevational view with a scoop portion of a loader removed and one side of the tractor broken away for clarity;

FIG. 3 is a top plan view of the clutch mechanism taken on the line 3—3 of FIG. 1 in partial section; and

FIG. 4 is a detail view of the cammed operating lever.

Referring to the drawings which disclose a preferred form of our invention, a front end loader vehicle indicated generally by the letter V has a pair of laterally spaced independently rotatable propulsion wheels W mounted on dead axles or stubshafts A positioned forward of the vehicle, a motor M mounted thereon for driving said wheels, a caster or swivel wheel C positioned rearwardly of the loader to impart maneuverability and stability to the loader, a scoop S and a pair of spaced vertical supporting plates P. Extending between and through each of the plates P and supported thereby near the top thereof is a horizontally disposed jack or drive shaft 6 having sprocket wheels 7 affixed to the ends thereof outwardly of the plates P, the shaft 6 and wheel 7 being continuously driven or rotated by means of an endless chain enclosed in housing 8 which is connected with and driven by motor M.

The loader is provided with a pair of identical but separate transmission systems for transmitting the driving power from jack shaft 6 to each of the propulsion wheels

W, each of said transmission systems being mounted on and supported by a plate P and indicated generally by the letter T, each of said transmission systems being enclosed by a housing H. The separate but identical transmission systems T mounted on each of the plates P are adapted to selectively transmit forward or reverse driving power from the jack shaft 6 to one of the propulsion wheels W, and is also adapted to permit idling of the wheel when desired.

In the form of our invention shown in the drawings, each transmission system T includes a pair of clutch units indicated generally by 9 and 9', one unit being for forward drive, the other for reverse drive. These clutch units each consist of a pair of clutch plates 10 and 11 and 10' and 11' respectively which are rotatably and coaxially mounted on horizontally spaced stubshafts 12 and 12' respectively, which shafts project laterally outwardly from and are supported by plate P, the opposing clutch plates being adapted for movement into radial frictional clutching engagement with one another.

Each of the clutch plates has projecting therefrom and coaxially united therewith a sprocket wheel for rotating the clutch plate, these sprocket wheels being indicated by the numerals 10*a*, 11*a*, 10*a*' and 11*a*' respectively. One clutch plate of each clutch unit has superimposed on and secured to its clutching surface a friction disc as indicated by 13 and 13' respectively. The outwardly disposed sprocket wheels 10*a* and 10*a*' abut with bearings 14 and 14' and are held on shafts 12 and 12' by means of end caps 15 and 15' respectively. Inwardly disposed of sprockets 11*a* and 11*a*' are bearings 16 and 16' and pressure collars or cam followers 17 and 17' which are mounted coaxially with sprockets 11*a* and 11*a*' on stubshafts 12 and 12', and are axially movable thereon. Said pressure collars 17 and 17', bearings 16 and 16', sprockets 11*a* and 11*a*' and clutch plates 11 and 11' are slidable back and forth along shafts 12 and 12' to enable plates 11 and 11' to move into and out of clutching engagement with friction discs 13 and 13' respectively, causing plates 11 and 11' to be rotatably driven by opposing revolving plates 10 and 10' respectively.

Mounted on plate P and interposed between plate P and cam followers 17 and 17' is an elongate shifting bar 18 whose outer face tapers inwardly from the ends thereof so that the thickest or drive portions 19 and 19' of the bar are found adjacent the ends thereof, and form camming surfaces which selectively engage the inner surfaces of cam followers 17 and 17' to move their respective clutches into driving engagement. The thinner central portion 19*a* of the shifting bar represents the neutral portion, and is of a length to permit it to oppose both cam followers simultaneously to disengage both clutches simultaneously and permit idling of the wheel W. Longitudinal slot 19*b* of bar 18 encloses stubshafts 12 and 12', and bar 18 is adapted to slide horizontally back and forth normal to the stubshafts 12 and 12' to selectively engage cam followers 17 and 17' and slide them in and out as they engage different parts of the cam surface, causing them to bear against their respective bearings which in turn bear against their respective sprockets and clutch plates 11 and 11' causing them to slide or move into clutching driving engagement with their respective plates 10 or 10'. Each of the bars 18 are caused to move backwards and forwards by means of one of the operating levers L in the cab of the vehicle, which are connected by suitable linkage to the bars.

Endless chain belt 20 is trained around sprocket 10*a*, 10*a*', chain belt tightner sprocket 25 and sprocket 7 of jack shaft 6 as shown in FIG. 1, causing clutch plates 10 and 10' to be rotated or driven continuously in the same direction (counterclockwise as shown in the draw-

BEST COPY AVAILABLE

ings) by the continuously rotating jack shaft 6 and sprocket 7.

As shown in the drawings, endless chain 21 is trained over sprocket 11a' and under sprocket 11a and thence around a rotatable idler or belt tightener sprocket wheel 22 and rotatably mounted gear reduction sprocket wheel 23 which is connected with and serves to rotate smaller reduction sprocket 24. Another endless chain 25 is trained around sprocket 24 and a sprocketed wheel 26 which is integrally united with, and serves to drive a wheel mounting disc 27 upon which is mounted wheel W.

By training the endless chain 21 under one sprocket wheel and over the other, the chain 21, and with it wheel W, will be driven in opposite directions according to which clutching unit is engaged, thereby providing selective reverse and forward driving of the propulsion wheel W.

In the operation of the form of our invention as shown in the drawings, in which only the transmission system for the left side of the vehicle is shown and described, the jack shaft 6 and clutch plates 10 and 10' are driven continuously in a counterclockwise direction. To drive the left side propulsion wheel W forward, the shifting bar 18 is moved forward by proper manipulation of one of the operating levers L in the cab until the various portions of the clutch assembly assume the positions shown in FIG. 3.

In the arrangement shown in FIG. 3, the drive camming surface 19' of bar 18 engages cam follower 17' and presses it outwardly, forcing the clutch plates 13' and 11' into clutching driving engagement, while cam follower 17 is opposed by the neutral surface 19a, which causes clutch unit 9 to be disengaged. Because the endless chain 21 is trained over sprocket 11a', which is driven counterclockwise in FIG. 3, the chain 21 is also caused to move in a counterclockwise direction which in turn, through the gear reduction and chain drive mechanism shown, drives propulsion wheel W in a counterclockwise or forward direction, thus in effect making clutch unit 9' the forward drive unit.

To drive the propulsion wheel rearwardly or in reverse direction, the shifting bar is moved backwards or to the rear, causing drive cam surface 19 to engage cam follower 17 and press clutch plates 10 and 11 into clutching engagement, with cam follower 17' moving into opposition with the neutral surface 19a, causing disengagement of clutch unit 9'. In this situation, with the sprocket wheel 11a being driven counterclockwise and the chain 21 being trained thereunder, the chain 21 is driven in a clockwise direction and in turn causes propulsion wheel W to rotate in a clockwise or reverse direction, thus in effect making clutch unit 9 the reverse drive unit.

To permit idling of the propulsion wheel W, the shifting bar 18 is moved to an intermediate or neutral position in which both cam followers 17 and 17' are placed in opposition to the thinner neutral surface 19a, causing disengagement of both clutching units 9 and 9'.

It is, of course, to be understood that the foregoing description applies equally well to the operation of both transmission systems and propulsion wheels on either side of the vehicle.

From the foregoing, the advantages of our invention are readily apparent. By manipulating the pair of operating levers in the cab, the propulsion wheels W may be simultaneously driven forwards or backwards to cause forward or reverse movement of the vehicle, or one wheel may be idled while the other is driven forwards or backwards, thus permitting the vehicle to pivot on the idle wheel and be turned in any desired direction, thus giving the vehicle maximum maneuverability and permitting the transmission system in cooperation with the propulsion wheels to perform the dual functions of driving and steering the vehicle.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of our invention.

What is claimed is:

1. In a self-propelled vehicle having independently rotatable propulsion wheels and a source of power for driving said wheels, a separate transmission system for propelling each of said wheels, each said transmission system comprising a pair of clutches, each said clutch comprising a pair of rotatable, coaxially mounted clutch plates adapted for movement into and out of frictional clutching engagement with one another, belt drive means interconnecting one clutch plate of each clutch with each other and with the source of power and adapted to rotate said clutch plates simultaneously in the same direction, belt drive means interconnecting the other clutch plate of each clutch with each other and with the propulsion wheel, the connection between the belt drive and the clutch plates being such that each plate drives the belt and propulsion wheel in an opposite direction to provide forward and reverse drive for said wheel, cam follower means associated with each of said clutches, and a movable shifting member having a camming surface opposed to and contiguous with adjacent pairs of said cam follower means, said camming surface including a pair of drive promoting cam portions and an idling portion and means for moving said member to selectively engage one of said drive promoting cam portions with one of said cam followers or with said idling portion to transmit forward or reverse driving power to said propulsion wheel or simultaneously disengage both clutches to permit idling of said wheel.

2. A self-propelled vehicle having a pair of spaced apart independently rotatable propulsion wheels, a caster wheel for maneuverability thereof, an operating cab and a source of power for driving said wheels, a common drive shaft driven by said power source and supplying driving power to each of said propulsion wheels, a separate transmission system for transmitting propelling power from said common drive shaft to each of said wheels, each said transmission system comprising a pair of juxtaposed substantially aligned axially parallel clutches, each said clutch comprising a pair of rotatable, co-axially mounted clutch plates adapted for relative axial movement into and out of frictional clutching engagement with one another, belt drive means interconnecting one clutch plate of each clutch with each other and with said common drive shaft to rotate said clutch plates simultaneously in the same direction, belt drive means interconnecting the other clutch plate of each clutch with each other and with a propulsion wheel, each of said other clutch plates being engaged with opposite sides of said belt drive means for reverse driving of said belt drive means and said propulsion wheel, follower means carried by each clutch directing the relative axial movement of the clutch plates constituting said clutch, an elongate slidable shifting member having a camming surface disposed transversely of the axis of rotation of said clutches and contiguously opposed to each of said cam follower means, said camming surface including a pair of longitudinally spaced apart protruding follower engaging drive promoting cam portions and an elongate recessed idling portion intermediate said cam portion for disengaging either of said clutches or both simultaneously, and means including a single operating member in the cab for reciprocating said slidable member across said cam followers to selectively engage one of said cam portions with one of said cam follower means to drivingly engage one of said clutches while simultaneously idling the other to optionally drive the propulsion wheel forwardly or backwardly or to simultaneously disengage both clutches to idle said wheel.

3. In a self-propelled vehicle having independently rotatable propulsion wheels and a source of power for driving said wheels, a separate transmission system for propelling each of said wheels, each said transmission system comprising a pair of clutches, each of said clutches comprising a pair of rotatable, co-axially mounted clutch plates adapted for movement into and out of frictional clutching engagement with one another, first belt drive means interconnecting one clutch plate of each clutch with each other and with the source of power and adapted to rotate said clutch plates simultaneously, second belt drive means interconnecting the other clutch plate of each clutch with each other and with the propulsion wheel, one of said belt drive means being wound in the same direction with respect to the plates engaged therewith whereby movement thereof in one direction causes rotation of said plates in the same direction, the other of said belt drive means being wound in opposite directions with respect to the plates engaged therewith whereby movement thereof in one direction causes rotation of said plates in opposite directions, cam follower means associated with each of said clutches, and a movable shifting member having a camming surface opposed to and contiguous with adjacent pairs of said cam follower means, said camming surface including a pair of drive promoting cam portions and an idling portion and means for moving said member to selectively engage one of said drive promoting cam portions with one of said cam followers or with said idling portion to transmit forward or reverse driving power to said propulsion wheel or simultaneously disengage both clutch to permit idling of said wheel.

4. In a self-propelled vehicle having independently rotatable propulsion wheels and a source of power for driving said wheels, a separate transmission system for propelling each of said wheels, each said transmission system comprising a pair of clutches, each of said clutches comprising a pair of rotatable, co-axially mounted clutch plates adapted for movement into and out of frictional clutching engagement with one another, first belt drive means interconnecting one clutch plate of each clutch with each other and with the source of power and adapted to rotate said clutch plates simultaneously, second belt drive means interconnecting the other clutch plate of each clutch with each other and with the propulsion wheel, one of said belt drive means being wound in the same direction with respect to the plates engaged therewith whereby movement thereof in one direction causes rotation of said plates in the same direction, the other of said belt drive means being wound in opposite directions with respect to the plates engaged therewith whereby movement thereof in one direction causes rotation of said plates in opposite directions with respect to each other, cam follower means cooperatively interconnected with each of said clutches, and shifting means including single cam members interconnected by a single shiftable connecting member and contiguous with each of said cam follower means and adapted to selectively cammingly engage one or the other of said cam follower means upon shifting movement of said connecting member for selectively engaging one or the other of said clutches or to simultaneously disengage both of them to permit idling of said wheel.

References Cited in the file of this patent

UNITED STATES PATENTS

821,477	Flinchbaugh	May 22, 1906
1,027,027	Bailey	May 21, 1912
1,470,078	Hellwarth	Oct. 9, 1923
1,623,929	Loyd	Apr. 5, 1927
2,336,642	Schreck	Dec. 14, 1943
2,572,911	Brown	Oct. 30, 1951
2,874,591	Thoma	Feb. 24, 1959

April 5, 1927. 1,623,929

J. LOYD

STEERING BY DRIVING MEANS FOR VEHICLES

Filed Nov. 12, 1924 4 Sheets-Sheet 1

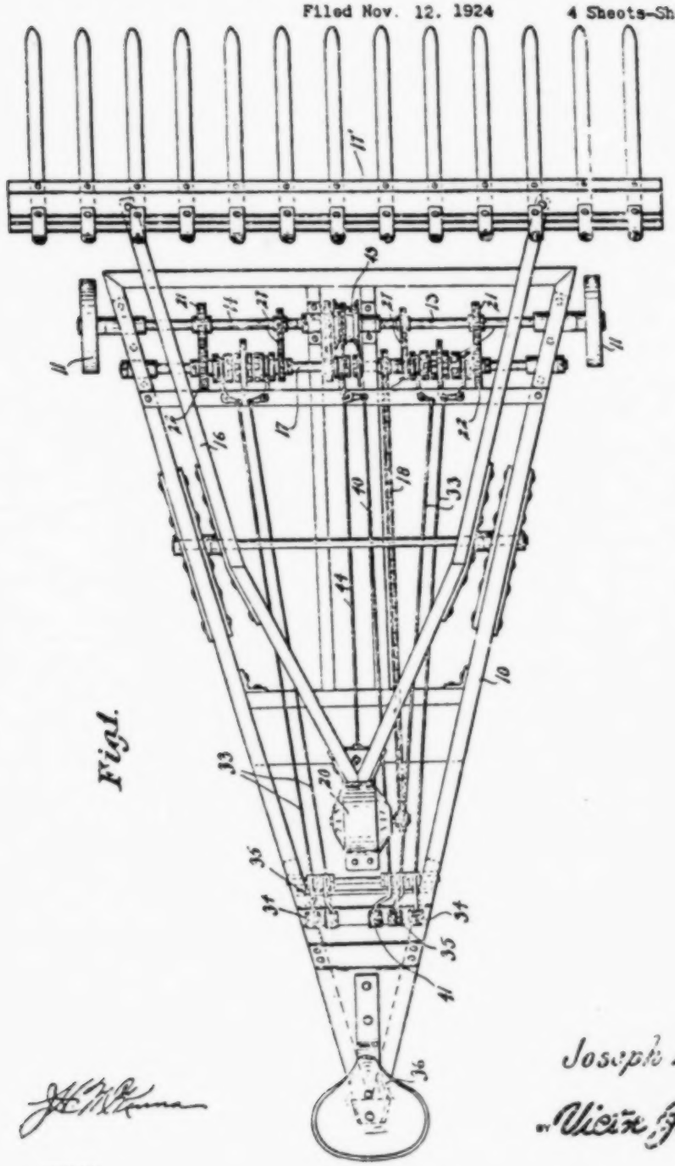


Fig.1.

Joseph Loyd,
INVENTOR
by Victor J. Evans,
ATTORNEY

WITNESS:

Ex 84
CLARK

April 5, 1927. 1,623,929

J. LOYD

STEERING BY DRIVING MEANS FOR VEHICLES

Filed Nov. 12, 1924 4 Sheets-Sheet 2

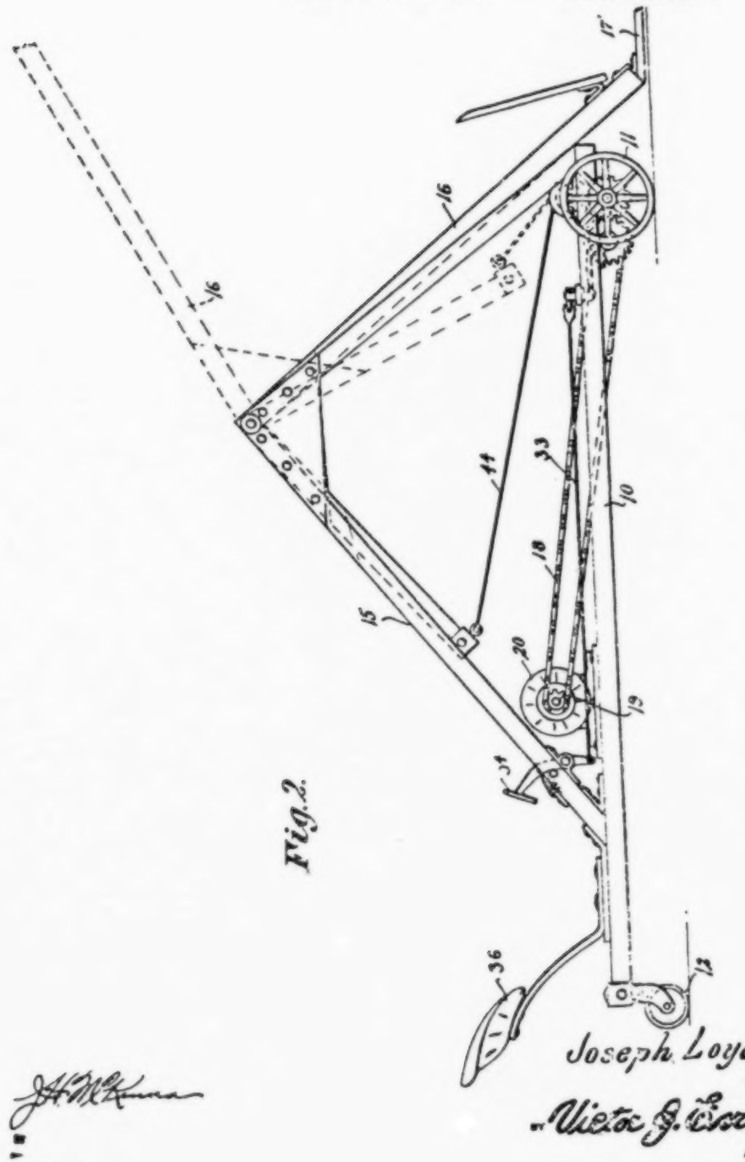


Fig.2.

Joseph Loyd,
INVENTOR
by Victor J. Evans,
ATTORNEY

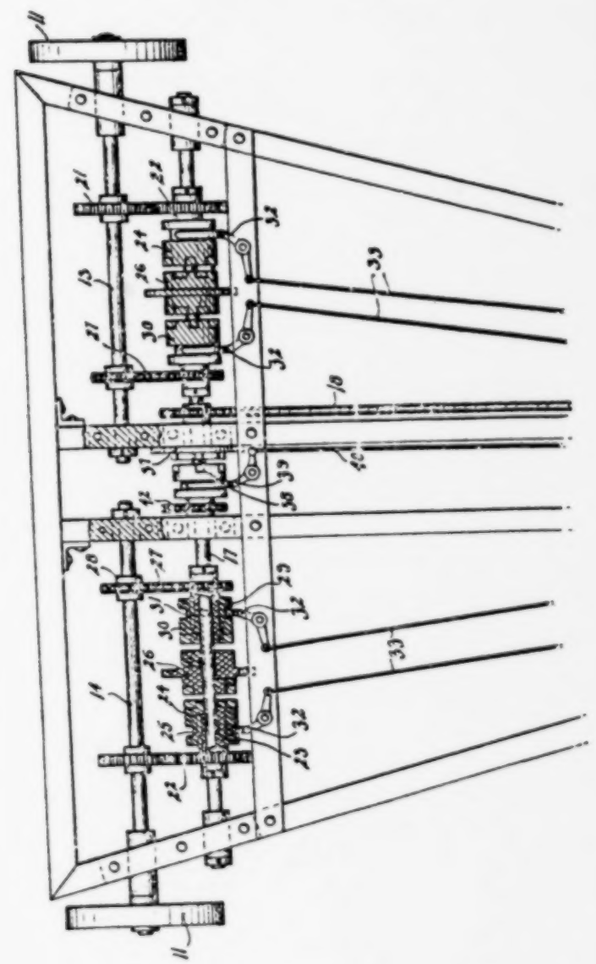
WITNESS:

April 5, 1927. J. LOYD 1,623,929

STEERING BY DRIVING MEANS FOR VEHICLES

Filed Nov. 12, 1924 4 Sheets-Sheet 3

Fig. 3.



Joseph Loyd,
INVENTOR
Victor J. Evans,
ATTORNEY

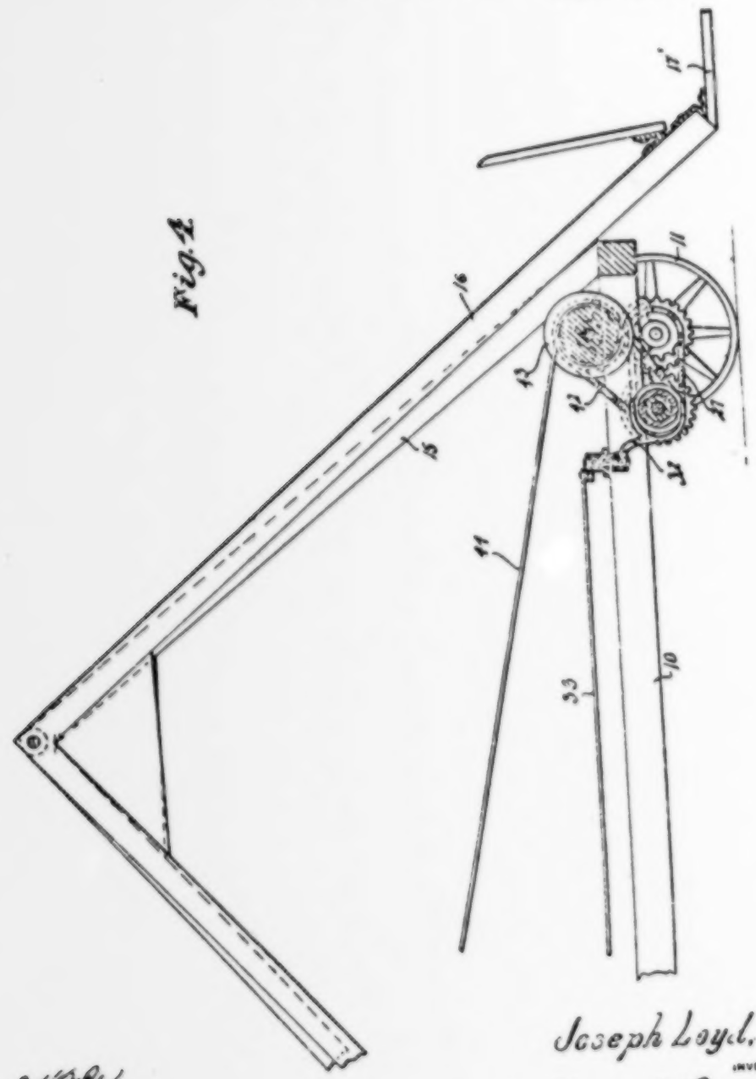
WITNESS:

April 5, 1927. J. LOYD 1,623,929

STEERING BY DRIVING MEANS FOR VEHICLES

Filed Nov. 12, 1924 4 Sheets-Sheet 4

Fig. 4.



Joseph Loyd,
INVENTOR
Victor J. Evans,
ATTORNEY

WITNESS:

Patented Apr. 5, 1927. 1,623,929

UNITED STATES PATENT OFFICE.

JOSEPH LOYD, OF BROKEN BOW, NEBRASKA.

STEERING BY DRIVING MEANS FOR VEHICLES.

Application filed November 12, 1924. Serial No. 749,537.

This invention contemplates the provision of means for steering a machine through the instrumentality of a plurality of clutches and pedals, by means of which the front wheels of the machine can be rotated in the same or reverse directions as the occasion may require.

Another object of the invention resides in the provision of means for propelling and steering a machine wherein the axles for the ground engaging wheels are capable of being rotated in the same or opposite directions, the invention being primarily intended for use in conjunction with a hay stacker, wherein a rack can also be raised or lowered by a food controlled clutch mechanism.

The nature and advantages of the invention will be better understood when the following detailed description is read in connection with the accompanying drawings, the invention residing in the construction, combination and arrangement of parts as claimed.

In the drawings forming part of this application, like numerals of reference indicate similar parts in the several views, and wherein:

Figure 1 is a top plan view of a hay stacker embodying the subject matter of the present invention.

Figure 2 is a side elevation showing the elevated position of the hay fork by dotted lines.

Figure 3 is a fragmentary plan view showing the clutch arranged for rotating the axles in the manner above specified.

Figure 4 is a sectional view taken on the line 4—4 of Figure 1.

Referring to the drawing in detail, 10 represents the frame of a hay stacker, the frame being mounted on wheels 11 which are arranged at the front thereof, and on a caster or the like 12 which is arranged at the rear end of the frame, the latter being of substantially triangular formation in plan as shown in Figure 1. Each wheel 11 is provided with an axle, and these axles are indicated at 13 and 14 respectively, being journalled in suitable bearings as clearly illustrated in Figure 3. Mounted on the main frame 10 and rising therefrom is an auxiliary frame 15 which is substantially of inverted V shaped formation, and pivoted on this auxiliary frame is a movable frame 16 of similar contour, which movable frame carries the hay fork indicated generally at 17'. The fork carrying frame 16 is of course pivoted on the frame 15 at the apex thereof, so that the fork 17' can either occupy its normal position shown by full lines in Figure 2, or be elevated to the position illustrated by the dotted line position of the movable frame 16 shown in Figure 3. Journalled on the main frame 10 directly behind and parallel with the axles above referred to is a driven shaft 17, this shaft being driven by an endless chain 18 which is trained over a sprocket carried by the shaft 17, and a similar sprocket carried by a motor shaft 19, the motor being indicated generally at 20. The shaft 17 drives the axles 13 and 14 respectively, a series of clutches being employed for this purpose, and arranged to be selectively used, to rotate both axles simultaneously in either a forward or rearward direction, or to rotate said axles relatively in opposite directions.

Upon inspection of Figure 3, it will be noted that each of the axles is provided with a gear 21 which meshes with a similar gear 22 fixed upon the shaft 17. Each gear 22 is carried by a sleeve 23, and slidably mounted on each sleeve is a clutch member 24 which is also connected with the sleeve by means of a key 25. Each clutch member 24 is normally spaced from a cooperating clutch member 26 which is fixed to the shaft 17. Each axle is also connected with the shaft 17 by means of sprockets and an endless chain, the latter being indicated at 27, and trained over a sprocket 28 fixed on the adjacent axle and a similar sprocket carried by a sleeve 29 which is fixed on the shaft 17. Arranged to slide on this sleeve 29 is a clutch member 30 which is also keyed to the sleeve as at 31, the clutch member 30 being normally spaced from the clutch member 26 above referred to. Manifestly, the axles 13 and 14 can be driven from the shaft 17 either through the gears 21 and 22 or by the chain 27, this depending upon which of the movable clutch members 24 and 26 respectively are moved into operative association with the clutch member 26. As shown in Figure 3, each sliding clutch member has associated therewith a pivoted arm 32 which is connected with the adjacent end of a rod 33, and each rod in turn is connected with a foot pedal as shown in Figure 1. Consequently, there is a pair of foot pedals 34 and 35 respectively for the clutch members 24 and 30, and each side of the frame,

and adjacent the driver's seat indicated at 36. These pedals are used selectively to rotate the axles 13 and 14 in the desired direction. For instance, when it is desired to rotate the axles 13 and 14 in a forward direction, the pedals 34 at the opposite sides of the machine are depressed, thereby moving the corresponding clutch members 24 into operative association with the adjacent clutch member 26, whereupon the gears 21 and 22 are employed to rotate the axles 13 and 14 in a forward direction. If it is desired to reverse the machine, the pedals 35 are depressed, thus throwing the corresponding clutch members 30 for the respective axles into operative association with the adjacent clutch member 26. Under these circumstances the axles 13 and 14 are rotated in a reverse direction through the instrumentality of the endless chains 27. When the clutch members are used in the manner just described, the clutches are used for propelling the machine in either a forward or rearward direction, which by reason of the construction and arrangement of parts, it is manifest that the clutches can also be used for steering the machine. In other words, the axles 13 and 14 are rotated in relatively opposite directions to allow the machine to make a short turn either to the right or to the left, and this is accomplished by using one of the clutch members 24 with the adjacent clutch member 26, and one of the clutch members 30 with its adjacent clutch member 26 at one and the same time. By depressing the pedal 34 at the right hand side of the machine, the axle 13 is rotated in a forward direction through the gears 21 and 22, while simultaneously depressing the clutch pedal 35 at the other side of the machine, will rotate the axle 14 in an opposite direction through the chain drive 27.

In addition to the clutches above described, the shaft 17 is also provided with a clutch member 37 arranged centrally on said shaft, while cooperating with this clutch 37 is a normally spaced sliding clutch member 38. The clutch member 38 has associated therewith a pivoted arm 39 which is connected with the adjacent end of the rod 40, the rod being actuated by means of a foot pedal 41 disposed adjacent one pair of pedals above referred to. When this pedal 41 is depressed, the clutch member 38 is moved into operative association with the clutch member 37, whereupon both clutch members rotate in unison. The clutch member 38 is employed to drive an endless chain 42, which is trained over a sprocket carried by the hub of a drum 43 which has connected therewith a flexible element 44 employed to raise or lower the fork carrying frame 16. In other words, the flexible element 44 is adapted to be wound about and unwound from the drum 43, and when the clutch member 38 is moved into operative association with the clutch member 37, the drum is rotated in a direction to wind the flexible element 44 thereabout thus exerting a pull upon the movable frame 16 to elevate the fork in the manner indicated; dotted line position of the frame in Figure 2. While the means for propelling and steering the machine is shown in connection with a hay stacking machine, I desire to have it understood that the invention can be used in connection with other types of machines, and that its general application is contemplated by the claim.

While it is believed that from the foregoing description, the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described, and that such changes may be resorted to when desired as fall within the scope of what is claimed.

Having thus described the invention, I claim:

In combination, a wheeled frame, a pair of aligned axles journaled thereon, a driven shaft arranged at one side and in parallelism with the axles, a gear carried by each axle, a central clutch member mounted on the shaft for each axle, a pair of cooperating clutch members slidably mounted on the shaft and arranged at the opposite sides of the central clutch member, an endless chain providing a driving connection between one of the cooperating clutch members and the adjacent axle, a gear carried by the other cooperating clutch member of each pair and meshing with the gear of the adjacent axle, pivoted arms associated with the cooperating clutch members, operating rods connected with the said arms, foot pedals associated with said rods, whereby said cooperating clutch members can be selectively actuated to rotate said axles in the same direction or in relatively different directions, an additional clutch member arranged centrally of the shaft, a cooperating sliding clutch member normally spaced from the last mentioned member, and pedal actuated means for controlling the sliding clutch member.

In testimony whereof I affix my signature.

JOSEPH LOYD.

Dec. 14, 1943. I. F. SCHRECK 2,336,642

TRACTOR UNIT FOR INDUSTRIAL TRUCKS

Filed Oct. 7, 1941 2 Sheets-Sheet 1

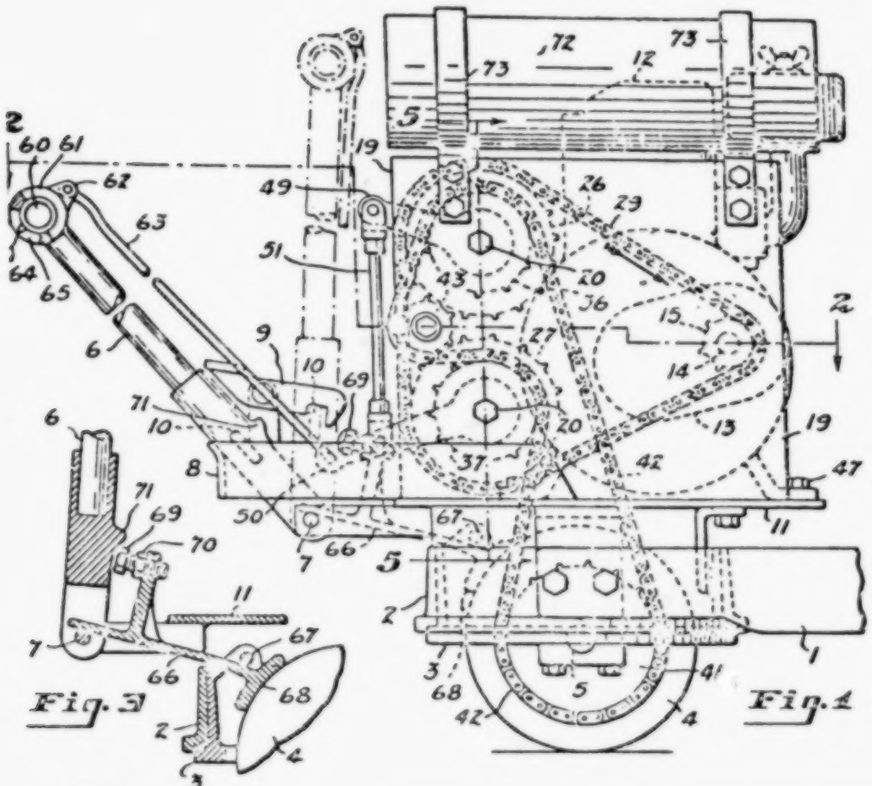


Fig. 3

Fig. 1

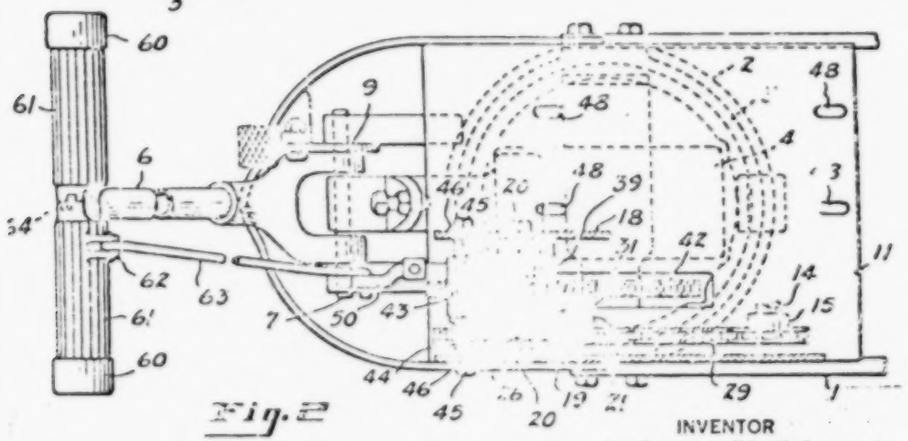


Fig. 2

INVENTOR
Irvin F. Schreck
BY Frank S. Greene
ATTORNEY

Ex. 85
CLARK

Dec. 14, 1943. I. F. SCHRECK 2,336,642

TRACTOR UNIT FOR INDUSTRIAL TRUCKS

Filed Oct. 7, 1941 2 Sheets-Sheet 2

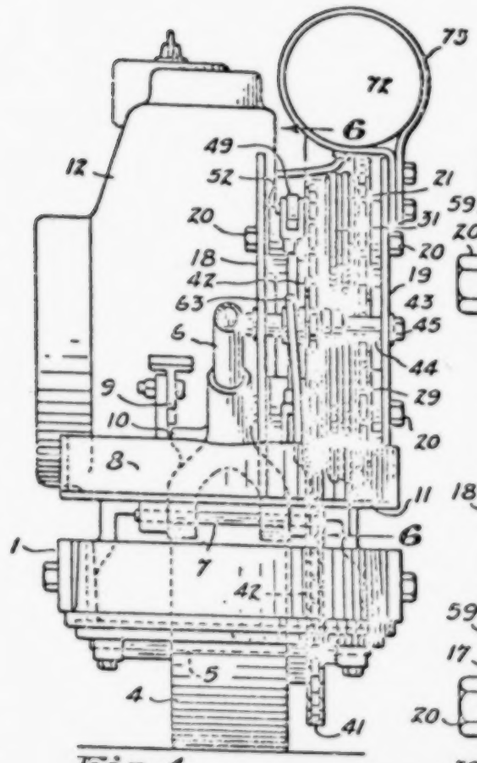


Fig. 4

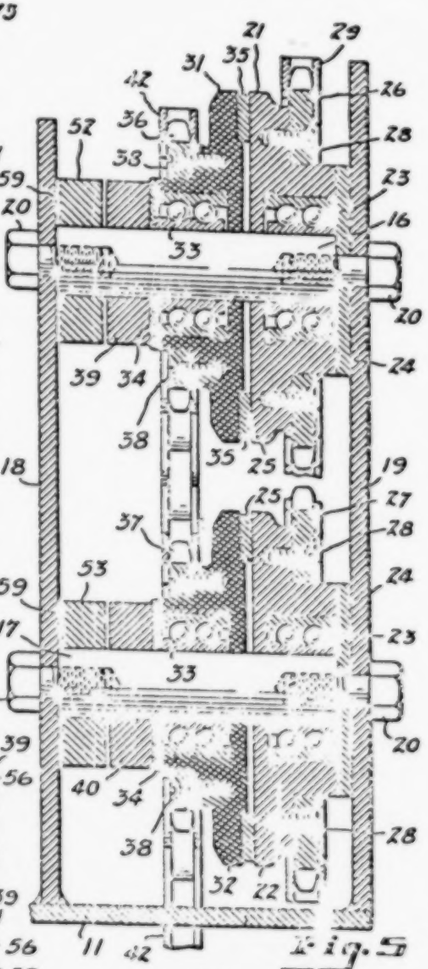


Fig. 5

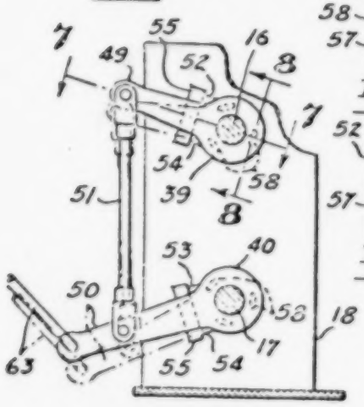


Fig. 6

Fig. 8

Fig. 9

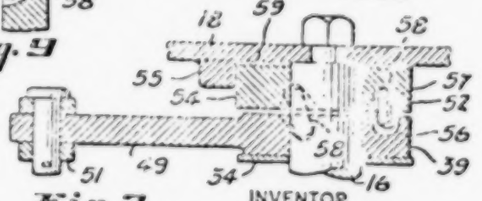


Fig. 7

INVENTOR
Irvin F. Schreck
BY Frank S. Greene
ATTORNEY

Patented Dec. 14, 1943

2,336,642

UNITED STATES PATENT OFFICE

2,336,642

TRACTOR UNIT FOR INDUSTRIAL TRUCKS

Irvin F. Schreck, Cleveland Heights, Ohio

Application October 7, 1941, Serial No. 413,968

15 Claims. (Cl. 180—13)

This invention relates to tractor units for industrial trucks and, more particularly, to the propelling mechanism and the controlling means therefor.

The invention has for an object to provide a tractor unit in which the traction wheel driving mechanism consists of a driving motor and a clutch controlled, reversible driving mechanism interposed between the motor and wheel, and in which the motor and mechanism are compactly mounted upon a relatively small supporting platform on the frame of the unit adjacent the traction wheel with the reversible driving mechanism occupying a narrow space alongside the motor.

The invention has for a further object to provide an inexpensive and compact clutch controlled, reversible driving mechanism for a tractor unit which is adapted to be controlled by a simple, manually operable clutch actuator.

A further object is to provide the tractor unit with a draft tongue by means of which the truck may be drawn manually, the tongue having clutch controlling means mounted thereon, by which the operation of the driving mechanism may be controlled by the operator.

A further object is to control the reversing mechanism by swinging movements of the draft tongue in such manner that the truck cannot be propelled toward the operator when the draft tongue is moved to its uppermost position, but which will permit the truck to be propelled in a rearward direction with the draft tongue in its uppermost position.

Further objects are to provide a clutch controlled reversing drive for the traction wheel through friction clutch elements which have only a slight axial movement between their engaged and disengaged positions and which free themselves as soon as axial pressure is released, and to provide simple and conveniently operable means for controlling such clutches.

A further object is to provide a simple chain and sprocket drive for the traction wheel, which includes a clutch operated reversing means.

With the above and other objects in view, the invention may be said to comprise the traction unit as illustrated in the accompanying drawings, hereinafter described, and particularly set forth in the appended claims, together with such variations and modifications thereof that will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of the specification, in which:

Figure 1 is a side elevation of a tractor unit embodying the invention and showing the tractor unit mounted in the forward end of a truck frame;

Fig. 2 is a horizontal section taken on the line indicated at 2—2 in Fig. 1 looking downwardly, the engine being removed in this view;

Fig. 3 is a fragmentary detail view showing the tongue operated brake in vertical section;

Fig. 4 is a front elevation of the tractor unit;

Fig. 5 is a section on an enlarged scale taken on the line indicated at 5—5 in Fig. 1;

Fig. 6 is a section taken on the line indicated at 6—6 in Fig. 4;

Fig. 7 is a sectional view on an enlarged scale taken on the line indicated at 7—7 in Fig. 6;

Fig. 8 is a section on an enlarged scale taken on the line indicated at 8—8 in Fig. 6; and

Fig. 9 is a section similar to Fig. 8 showing the shifter collar and thrust pin in clutch engaging position.

Referring to the accompanying drawings, the tractor unit of the present invention is shown mounted in the forward end of a truck frame 1. The tractor unit is mounted in the truck frame 1 to turn about a vertical axis, the frame 3 of the tractor unit being rotatably mounted in an annular bearing member 2 at the forward end of the frame 1 and being provided with an annular bearing portion which fits within the bearing portion 2 of the truck frame. A traction wheel 4 has an axle 5 mounted on the annular bearing member 3, so that the wheel 4 is a steering wheel as well as a traction wheel. The mounting of the tractor unit in the truck frame is substantially the same as in the truck shown and described in my Patent No. 2,209,353, granted July 30, 1940.

A draft tongue 6 is connected by a horizontal pivot 7 to the tractor unit frame 3 and by means of this tongue the tractor unit may be turned within the bearing portion 2 of the truck frame to steer the truck, and the truck may be drawn forwardly or pushed rearwardly by means of the tongue 6, when desired. The downward movement of the tongue 6 is limited by engagement of the tongue with a bumper bar 8 at the forward end of the tractor unit frame 3 and the tongue may be detachably secured in its uppermost, substantially vertical position by means of a latch 9 pivotally mounted on the bumper bar 8 and loosely engaging a lug 10 adjacent the rearward end of the tongue 6.

The tractor unit frame has a platform 11 which provides a support for a driving motor 12, which may be an internal combustion engine. Through

suitable gearing in a reduction gear housing 13, the motor 12 drives a horizontal shaft 14 above the rear end portion platform 11, the shaft 14 having a sprocket 15 attached thereto, through which the propelling mechanism is driven. Forwardly of the shaft 14, two vertically spaced shafts 16 and 17 are mounted between inner and outer uprights 18 and 19 attached to the platform 11. The outer upright 19 is in the form of a plate extending substantially the full length of the platform 11 along an edge thereof. The inner upright 18 is a narrower plate disposed between a portion of the motor 12 and the forward end of the platform 11. The shafts 16 and 17 are clamped between the uprights 18 and 19 by means of bolts 20 which extend through the uprights 18 and 19 and screw into threaded bores in the ends of the shafts.

Adjacent the outer upright 19, clutch elements in the form of friction disks 21 and 22 are rotatably mounted upon the shafts 16 and 17. The disks 21 and 22 are provided with ball thrust bearings 23, the inner rings of which bear against washers 24 clamped between the upright 19 and the outer ends of the shafts 16 and 17. On their inner sides, the disks 21 and 22 have flat friction faces 25, and to the outer sides of the disks sprockets 26 and 27 are rigidly attached to the disks 21 and 22 by means of screws 28. A sprocket chain 29 extends over the sprockets 15, 26 and 27 so that when the sprocket 15 is driven by the motor 12, the sprockets 26 and 27 are continuously rotated in the same direction. Adjacent to and inwardly of the clutch disks 21 and 22, clutch disks 31 and 32 are mounted, disks 21 and 31 providing a pair of coacting clutch elements on the upper shaft 16 and the disks 22 and 32 providing a similar pair of clutch elements on the shaft 17. The disks 31 and 32 are provided with ball thrust bearings 33, the inner races of which are slidable on the shafts 16 and 17 and engageable with thrust washers 34 on the shafts 16 and 17. The disks 31 and 32 are provided with flat facing rings 35 composed of suitable friction material which are engageable with the faces 25 of the disks 21 and 22. By pressing either of the disks 31 or 32 axially toward the opposed disks 21 or 22, either of the disks 31 or 32 may be caused to turn in unison with the motor driven disk on its shaft. Sprockets 36 and 37 are rigidly attached to the disks 31 and 32 by means of screws 38. The clutch disk 31 of the upper pair is adapted to be pressed into engagement with the disk 21 by means of a shifter collar 39 slidable on the shaft 16; and the disk 32 on the lower shaft 17 is adapted to be pressed into clutching engagement with the disk 22 by means of a shifter collar 40 slidably mounted on the shaft 17 immediately beneath the collar 39.

A sprocket 41 is attached to the traction wheel 4 and a sprocket chain 42 extends around the sprocket 36 on the upper shaft 16 and the sprocket 41. An idler sprocket 43 is mounted on a horizontal shaft 44 and is positioned intermediate the shafts 16 and 17 and forwardly thereof. The sprocket chain 42 extends over the idler sprocket 43 and rearwardly therefrom with its exterior engaging the sprocket 37 on the shaft 17 through an arc of contact sufficient for effective driving engagement. When the upper pair of clutch elements 21 and 31 are engaged, the sprockets 26 and 36 are simultaneously rotated in the same direction and the chain 42 and the traction wheel 4 are driven through the sprocket 36. When the pair of clutch elements 22 and 32 on the lower shaft 17 are engaged, the sprockets 27 and 37 are rotated in unison and the chain 42 is driven through the sprocket 37. By reason of the fact that the sprocket 36 engages the interior of the sprocket chain 42 while the sprocket 37 engages the exterior of the sprocket chain 42, the chain 42 is driven in one direction through the sprocket 36 when the sprocket 36 is clutched to the sprocket 26 and in the opposite direction through the sprocket 37 when the sprocket 37 is clutched to the sprocket 27.

In order to maintain the proper tension in the sprocket chain 42, the sprocket 43 may be mounted in any suitable way for horizontal adjustment. As herein shown, the sprocket 43 is mounted on a shaft 44 which is clamped between the uprights 18 and 19 by means of bolts 45 extending through horizontal slots 46 in the uprights 18 and 19. By properly positioning the bolts 45 in the slots 46 before clamping the shaft in place, the sprocket 43 may be adjusted to take up any slack in the sprocket chain 42. The engine is attached to the platform 11 by means of suitable anchoring bolts 47, which pass through longitudinal slots 48 in the platform. By adjusting the engine on the platform before tightening the bolts 47, the proper tension may be applied to the sprocket chain 26.

The shifter collars 39 and 40 have integral, forwardly extending arms 49 and 50 which are connected by a link 51 so that the collars 39 and 40 are constrained to turn simultaneously in the same direction. Stationary collars 52 and 53 are interposed between the shifter collars 39 and 40 and the inner supporting standard 18. The collars 52 and 53 are provided with peripheral projections 54 which engage with fixed lugs 55 on the supporting standard 18 to hold the collars 52 and 53 against turning movements on the shaft. The shifter collar 39 and adjacent stationary collar 52 on the upper shaft 16, and the shifter collar 40 and adjacent stationary collar 53 on the lower shaft 17 are provided on their opposed faces with circumferentially spaced recesses 56 and 57, which provide seats for opposite ends of thrust pins 58. The pins 58 between the two collars on each shaft are regularly spaced about the axis of the collars at an inclination to the opposed faces of the collars. The pins 58 engaging each of the shifter collars 39 and 40 are so disposed that upon turning movement of the collar in one direction the pins move toward a position parallel with the axis and exert an axial thrust on the collar. The thrust pins 58 engaging one shifter collar are inclined oppositely to the pins engaging the other shifter collar so that pressure is applied to one collar when it is turned in one direction and to the other collar when it is turned in the opposite direction. As illustrated in the drawings, the pins 58 interposed between the collars 39 and 52 move from the position shown in Fig. 8 to the position shown in Fig. 9 when the arms 49 and 50 are moved downwardly, exerting an axial pressure against the collar 39 and pressing the clutch element 31 into engagement with the clutch element 21. When the arms 49 and 50 are moved upwardly from the neutral position shown in full lines in Fig. 6, the thrust pins 58 interposed between the collars 40 and 53, which are oppositely disposed with respect to the pins between the collars on the upper shaft, apply axial pressure to the collar 40, engaging the clutch elements 22 and 32. Thus, by moving the arms 49 and 50 upwardly or down-

wardly, the truck may be propelled in a forward or a rearward direction.

Only a very slight clearance is necessary between the clutch disks and the actuating collars need have very little axial movement since axial pressure is necessary to maintain driving engagement between the friction clutch elements. Since the clutch actuating collars are actuated by turning movements in a vertical direction, the entire reversible driving mechanism may be mounted in the narrow space between the uprights 18 and 19. In order to properly position the clutch elements and to compensate for wear between the friction faces of the clutch elements, shims 59 may be inserted between the thrust collars 52 and 53 and the supporting standard 18.

At its forward end the draft tongue 6 is provided with a transverse handgrip portion 60, upon which is rotatably mounted a sleeve 61. The sleeve 61 has a projecting lug 62, to which one end of a rod 63 is pivotally attached. The opposite end of the rod 63 is pivotally connected to the outer end of the lower forwardly projecting arm 50. The operator by gripping the sleeve 61 and turning the same in a counterclockwise direction, as viewed in Fig. 1, lifts the arms 49 and 50, clutching the sprocket 37 to the sprocket 27 to propel the truck forwardly. Upon turning movement of the sleeve 61 in a clockwise direction, the arms 49 and 50 are moved downwardly to clutch the sprocket 36 to the sprocket 26 to propel the truck rearwardly.

Whenever the truck tends to overtake the operator walking ahead of the truck holding the handgrip of the tongue, the tongue 6 will be moved towards vertical position and means is provided for controlling the operation of the driving mechanism by the tongue to automatically move the clutch actuators to neutral position to prevent injury to an operator, the operating connections being so arranged that when the tongue approaches its uppermost position, as shown in dotted lines in Fig. 1, the shifter collars are held against movement in a direction to engage the clutch through which the truck is propelled forwardly. Suitable means is provided for limiting the turning movements of the sleeve 61 with respect to the handgrip 60, so that in the uppermost position of the tongue the sleeve 61 is normally in its neutral position and is movable in one direction only from its neutral position. As shown in Fig. 1 of the drawings, the rod 63 bears against the sleeve 61 when the rod is in vertical position and prevents turning of the sleeve in a counterclockwise direction. To provide for disengagement of the clutch through which the truck is propelled forwardly at the desired point in the movement of the draft tongue, the handgrip portion 60 of the tongue may be provided with a radial pin 64, which extends through an arcuate slot 65 in the sleeve 61. The pivotal connection between the arm 50 and the actuating rod 63 is spaced from the pivot 7 of the tongue so that vertical swinging movements of the tongue 6 cause the handgrip portion 60 to turn within the sleeve 61. The pin 64 and the slot 65 are so arranged that when the tongue approaches its uppermost position the pin 64 engages with an end of the slot 65, so that further turning movement of the handgrip 60 within the sleeve is prevented. The range of movement of the actuating members on the tongue is thus positively restricted to a movement from neutral position to a position engaging the clutch through which the truck is propelled rearwardly and the lifting of the arms 49 and 50 to clutch the sprockets 27 and 37 is prevented, so that with the tongue in this position the truck cannot be propelled forwardly. The sleeve 61, however, is free to turn in a clockwise direction when the tongue is in its uppermost position, so that the operator may cause the truck to be propelled rearwardly when the handle is in this position.

To enable the operator to bring the truck quickly to a stop, a brake is provided which is controlled by the draft tongue 6. The brake device comprises a bar 66 which is slidably mounted on the frame 2 and guided by the pivot 7, and a pin 67 on the frame 3 adjacent the periphery of the wheel, the bar 66 carrying a brake shoe 68 which is brought into engagement with the periphery of the wheel upon a pivotal movement of the tongue 6. The bar 66 carries an adjustable abutment in the form of a screw 69, which is adapted to be secured in adjusted position by means of a nut 70. The head of the screw 69 is in the path of movement of a lug 71 on the tongue 6 and is engaged by the lug 71 as the tongue 6 approaches its vertical position. By pressing the upper end of the tongue 6 toward the truck, pressure is applied through the bar 66 to the brake shoe 68 bearing against the periphery of the wheel 4. Sufficient play is provided between the latch 9 and lug 10 with the latch in locking position to permit the application of the brake. Upon release of the pressure exerted by the draft tongue the brake is brushed away from the wheel tread when the wheel rotates.

A fuel tank 72 may be mounted upon the upper end of the outer standard 18 and suitable bracket 73 attached to the standard.

The operator by gripping the sleeve 61 and exerting a forward pull on the draft tongue can, with little effort, turn the sleeve in a direction to exert a pull upon the rod 63, lift the arms 49 and 50, and engage the lower clutch to propel the truck forwardly. Likewise, by gripping the sleeve 61 and exerting a rearward push, the rod 63 is actuated with little effort to move the arms 49 and 50 downwardly and engage the upper clutch to propel the truck rearwardly. By maintaining his grip on the sleeve 61 after initial actuation, the necessary pressure may be maintained upon the engaged clutch element. At any time the traction wheel may be released from the driving mechanism by merely releasing the sleeve 61 and the truck may be quickly stopped by swinging the draft tongue to brake applying position.

The present invention provides a simple and compact self-propelled tractor unit having a clutch controlled reversing mechanism controlled by actuators which are directly connected to operating members on the draft tongue in such a way as to provide a convenient and safe control of the driving mechanism by an operator walking in the direction of travel of the truck and guiding its movement by means of the draft tongue.

It is to be understood that variations and modifications of the specific devices herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

What I claim is:

1. A tractor unit comprising a frame, a traction wheel journaled in the frame, a draft tongue pivoted at its rearward end to the frame to swing about a horizontal axis, a motor carried by the frame, means for driving the traction wheel from

said motor including a clutch controlled reversing mechanism, means for operating said clutches including an operating member mounted for movement in either direction from a neutral position to cause said unit to be propelled forwardly or rearwardly, an actuating member movably mounted on said tongue, a rod connected to said actuating member and pivoted to said clutch operating member laterally of the pivotal axis of the tongue whereby said actuating member is moved relatively to the tongue upon a swinging movement of said tongue, and means for limiting the movement of the actuating member in one direction with respect to the tongue to restrict the movement of said clutch operating member to a movement in one direction from neutral position when said tongue is in its uppermost position.

2. A tractor unit comprising a frame, a traction wheel journaled in the frame, a draft tongue pivoted at its rearward end to the frame to swing about a horizontal axis, a motor carried by the frame, means for driving the traction wheel from said motor including a clutch controlled reversing mechanism, means for operating said clutches including an operating member mounted for movement in either direction from a neutral position to cause said unit to be propelled forwardly or rearwardly, an actuating member mounted upon said tongue and operably connected to said clutch operating member to actuate the same in either direction, and means controlled by swinging movements of said tongue for preventing actuation of said clutch operating member in a direction to propel said unit forwardly when said tongue is in its uppermost position.

3. A tractor unit comprising a frame, a traction wheel journaled in the frame, a draft tongue connected at its rearward end to said frame to swing about a horizontal axis, said tongue having a transverse handgrip portion adjacent its forward end, a motor carried by the frame, means for driving the traction wheel from said motor including a clutch controlled reversing mechanism, means for operating said clutches including a clutch operating member mounted for movement in either direction from a neutral position to cause the unit to be propelled forwardly or rearwardly, a sleeve rotatably mounted on said handgrip portion, an actuating rod connected eccentrically to said sleeve and pivoted to said clutch operating member laterally of the pivotal axis of the tongue whereby said handgrip portion turns within said sleeve as said tongue is swung vertically, and means for limiting the turning movement of the sleeve with respect to said hand grip to restrict the movement of said clutch operating member to a movement in one direction from neutral position when said draft tongue is in its uppermost position.

4. A tractor unit comprising a supporting frame, a traction wheel, a draft tongue connected at its rearward end to said frame to swing about a horizontal axis, said tongue having a transverse handgrip portion adjacent its forward end, a motor mounted on the frame, means including a clutch controlled reversing mechanism for driving said traction wheel from said motor, means for operating said clutches including a vertically movable clutch operating member movable upwardly or downwardly from a neutral position to propel the unit forwardly or rearwardly, a sleeve rotatably mounted on said handgrip portion, an actuating rod connected eccentrically to said sleeve and pivoted to said clutch operating member, the pivot connecting said rod and clutch operating member being spaced from the pivotal axis of the tongue, whereby said handgrip portion turns within the sleeve as the draft tongue is swung vertically, and means for limiting the turning movement of the sleeve with respect to the handgrip portion to restrict the range of movement of said control member when said draft tongue is in its uppermost position to a movement downwardly from neutral position.

5. A tractor unit comprising a frame, a motor carried by the frame, a traction wheel journaled in the frame, a draft tongue pivoted to the frame, two spaced parallel shafts mounted in the frame, a pair of clutch elements mounted on each shaft, a driving connection between said motor and one clutch element of each pair for continuously rotating the latter clutch elements, a driving connection between each of the other two clutch elements and said wheel, one of said driving connections being a reverse driving connection, clutch operating means including an actuating member movable in one direction from a neutral position to engage the clutch elements of one pair and in the opposite direction from said neutral position to engage the clutch elements of the other pair, whereby said wheel may be driven in a forward or reverse direction, and means carried by said draft tongue for operating said actuating member.

6. A tractor unit comprising a frame, a motor carried by the frame, a traction wheel journaled in the frame, a draft tongue pivoted to the frame, two spaced horizontal shafts mounted in the frame, a pair of clutch elements having opposed friction faces mounted side by side on each shaft, one clutch element of each pair being slidable upon the shaft to engage or disengage said friction faces, a driving connection between the motor and one clutch element of each pair for continuously rotating the latter clutch elements, a driving connection between each of the other two clutch elements and said wheel, one of said driving connections being a reverse driving connection, means for pressing together the friction faces of the clutch elements of either pair including an actuating member movable in one direction from a neutral position to engage the clutch elements of one pair in the other direction from said neutral position to engage the clutch elements of the other pair, whereby said wheel may be driven in a forward or reverse direction and means carried by said tongue for operating said actuating member.

7. A tractor unit comprising a frame, a motor carried by the frame, a traction wheel journaled in the frame, a draft tongue pivoted to the frame, two spaced horizontal shafts mounted in the frame, a pair of clutch elements having opposed friction faces mounted side by side on each shaft, one clutch element of each pair being slidable upon the shaft to engage or disengage said friction faces, a driving connection between the motor and one clutch element of each pair for continuously rotating the latter clutch elements, a driving connection between each of the other two clutch elements and said wheel, one of said driving connections being a reverse driving connection, a collar slidably and rotatably mounted on each of said shafts adjacent each of the slidable clutch elements, an arm attached to each collar, a link connecting said arms to cause the collars to turn simultaneously in the same di-

rection, means interposed between one collar and the frame for pressing said collar toward clutch engaging position upon a turning movement in one direction from a neutral position, means interposed between the other collar and the frame for pressing the latter collar toward clutch engaging position upon a turning movement in the opposite direction from said neutral position, an actuating member carried by said tongue and connected to one of said arms.

8. A tractor unit comprising a frame, a motor carried by the frame, a traction wheel journaled in the frame, a draft tongue pivoted to the frame, two spaced horizontal shafts mounted in the frame, a pair of clutch elements having opposed friction faces mounted side by side on each shaft, one clutch element of each pair being slidable upon the shaft to engage or disengage said friction faces, a driving connection between the motor and one clutch element of each pair for continuously rotating the latter clutch elements, a driving connection between each of the other two clutch elements and said wheel, one of said driving connections being a reverse driving connection, a collar slidably and rotatably mounted on each of said shafts adjacent each of the slidable clutch elements, an arm attached to each collar, a link connecting said arms to cause the collars to turn simultaneously in the same direction, means interposed between one collar and the frame for pressing said collar toward clutch engaging position upon a turning movement in one direction from a neutral position, means interposed between the other collar and the frame for pressing the latter collar toward clutch engaging position upon a turning movement in the opposite direction from said neutral position, a handgrip bar at the outer end of said tongue, a sleeve rotatably mounted on said bar, and an actuating rod connected at one end to said sleeve and at its opposite end to one of said arms.

9. A tractor unit comprising a frame, a motor carried by the frame, a traction wheel journaled in the frame, a draft tongue pivoted to the frame, two spaced horizontal shafts mounted in the frame, a pair of clutch elements having opposed friction faces mounted side by side on each shaft, one clutch element of each pair being slidable upon the shaft to engage or disengage said friction faces, a driving connection between the motor and one clutch element of each pair for continuously rotating the latter clutch elements, a driving connection between each of the other two clutch elements and said wheel, one of said driving connections being a reverse driving connection, a collar slidably and rotatably mounted on each of said shafts adjacent each of the slidable clutch elements, an arm attached to each collar, a link connecting said arms to cause the collars to turn simultaneously in the same direction, thrust pins interposed between said collars and the frame, said thrust pins being angularly movable upon turning movement of the collars and arranged to exert an axial thrust on one collar toward clutch engaging position upon a turning movement of the collars in one direction from a neutral position and to exert an axial thrust upon the other collar toward clutching position when the collars are turned in an opposite direction from said neutral position, an actuating member carried by said tongue and connected to one of said arms.

10. A tractor unit comprising a frame, a traction wheel journaled in the frame, a draft tongue pivoted at its rearward end to the frame to swing about a horizontal axis, a motor carried by the frame, means for driving the traction wheel from said motor including a clutch controlled reversing mechanism, two spaced parallel shafts mounted on said frame, means for driving said traction wheel to propel the unit forwardly including a pair of relatively movable friction clutch elements on one of said shafts, means for driving said traction wheel to propel the unit rearwardly including a pair of relatively movable friction clutch elements on the other shaft, a sleeve rotatably mounted on said handgrip portion, and means operated by said sleeve for engaging the clutch elements on one shaft upon a turning movement of the sleeve in one direction and for engaging the clutch elements on the other shaft upon a turning movement of the sleeve in the opposite direction.

11. A tractor unit comprising a frame, a traction wheel journaled in the frame, a draft tongue pivoted at its rearward end to the frame to swing about a horizontal axis, a motor carried by the frame, means for driving the traction wheel from said motor including a clutch controlled reversing mechanism, two spaced parallel shafts mounted on said frame, means for driving said traction wheel to propel the unit forwardly including a pair of relatively movable friction clutch elements on one of said shafts, means for driving said traction wheel to propel the unit rearwardly including a pair of relatively movable friction clutch elements on the other shaft, a sleeve rotatably mounted on said handgrip portion, and means controlled by pivotal movements of the tongue for holding one of said clutch elements out of engaging position.

12. A tractor unit for trucks comprising a frame, a motor carried by said frame, a traction wheel journaled in said frame, two spaced shafts mounted in the frame above and parallel with the axis of said wheel, a clutch element rotatably mounted on each of said shafts, means interposed between the motor and said clutch elements for driving both clutch elements in the same direction, a second clutch element rotatably mounted on each shaft alongside the motor driven clutch element, the two clutch elements on each shaft being relatively movable on the shaft into and out of clutching engagement, means for shifting said movable clutch elements including a movable operating member and means connecting said member to a clutch element of each pair operable to engage one pair of clutch elements upon movement of said member in one direction from a neutral position and to engage the other pair of clutch elements upon movement of said member in the opposite direction from said neutral position, a wheel driving sprocket, a sprocket attached to each of said second clutch elements, and a sprocket chain extending around said wheel driving sprocket and one of said clutch attached sprockets and having its exterior in driving engagement with the other of said clutch attached sprockets, whereby said traction wheel may be driven in one direction by one of said clutch attached sprockets or in the opposite direction by the other.

13. A tractor unit for trucks comprising a frame, a motor carried by said frame, a traction wheel journaled in said frame, two spaced parallel shafts mounted in the frame above and parallel with the axis of said wheel, a clutch element rotatably mounted on each of said shafts, means interposed between the motor and said clutch elements for driving both clutch elements in the same direction, a second clutch element rotatably mounted on each shaft alongside the motor driven clutch element, the two clutch elements on each shaft being relatively movable on the shaft into and out of clutching engagement, means for shifting said movable clutch elements including a movable operating member and means connecting said member to a clutch element of each pair operable to engage one pair of clutch elements upon movement of said member in one direction from a neutral position and to engage the other pair of clutch elements upon movement of said member in the opposite direction from said neutral position, a wheel driving sprocket, a sprocket attached to each of said second clutch elements, and a sprocket chain extending around said wheel driving sprocket and one of said clutch attached sprockets and having its exterior in driving engagement with the other of said clutch attached sprockets, whereby said traction wheel may be driven in one direction by one of said clutch attached sprockets or in the opposite direction by the other.

14. A tractor unit for trucks comprising a frame, a motor carried by the frame, a traction wheel journaled in the frame, a wheel driving sprocket, a motor driven sprocket, two spaced shafts mounted in the frame, a pair of sprockets rotatably mounted side by side on each of said shafts, the sprockets of each pair having opposed clutch elements attached thereto, one sprocket of each pair being slidable upon the shaft toward and away from the other sprocket of the pair to engage or disengage the clutch elements, a sprocket chain engaging one sprocket of each of said pairs and the motor driven sprocket, a second sprocket chain engaging the wheel driving sprocket and the other sprockets of said pairs, one of said chains extending around both the sprockets on said spaced shafts with which it engages, the other chain extending around the sprocket on one of said shafts with which it engages and having its exterior in driving engagement with the sprocket with which it engages on the other of said shafts, and means for shifting the movable sprocket of either of said pairs to clutch the sprockets of the pair together.

15. A tractor unit comprising a frame, a traction wheel journaled in the frame, a motor carried by the frame, two spaced parallel shafts mounted on said frame, means for driving said traction wheel to propel the unit forwardly including a pair of relatively movable friction clutch elements on one of said shafts, means for driving said traction wheel to propel the unit rearwardly including a pair of relatively movable friction clutch elements on the other shaft, a collar mounted to slide and turn on each of said shafts adjacent the movable clutch elements on each shaft, means associated with one collar for sliding the collar on the shaft to engage the adjacent pair of clutch elements upon turning movement in one direction, means associated with the second collar for sliding the same on the shaft to engage the other pair of clutch elements upon a turning movement in the opposite direction, and means for simultaneously turning the two collars in either direction to clutch one or the other pair of clutch elements.

IRVIN P. SCHRECK.

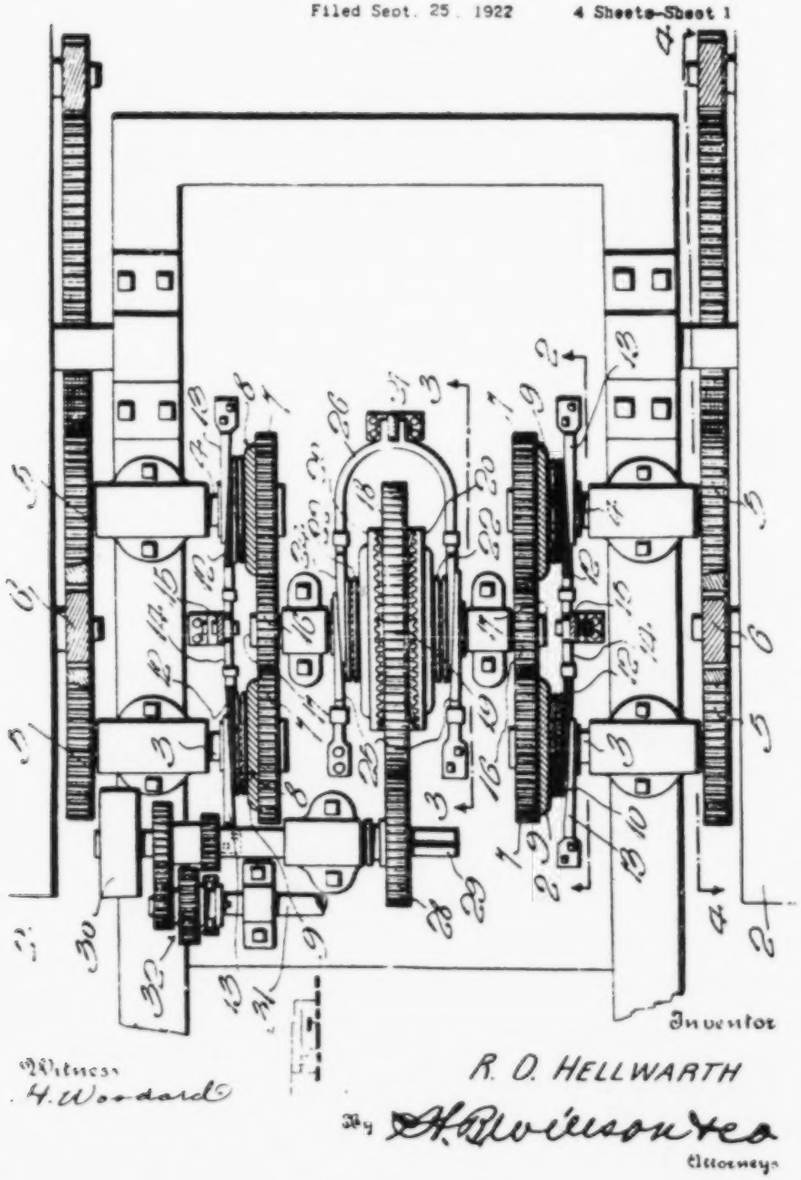
Ex 86

Oct. 9, 1923. 1,470,078

R. O. HELLWARTH

TRANSMISSION MECHANISM

Filed Sept. 25, 1922 4 Sheets-Sheet 1



Witness
H. Woodard

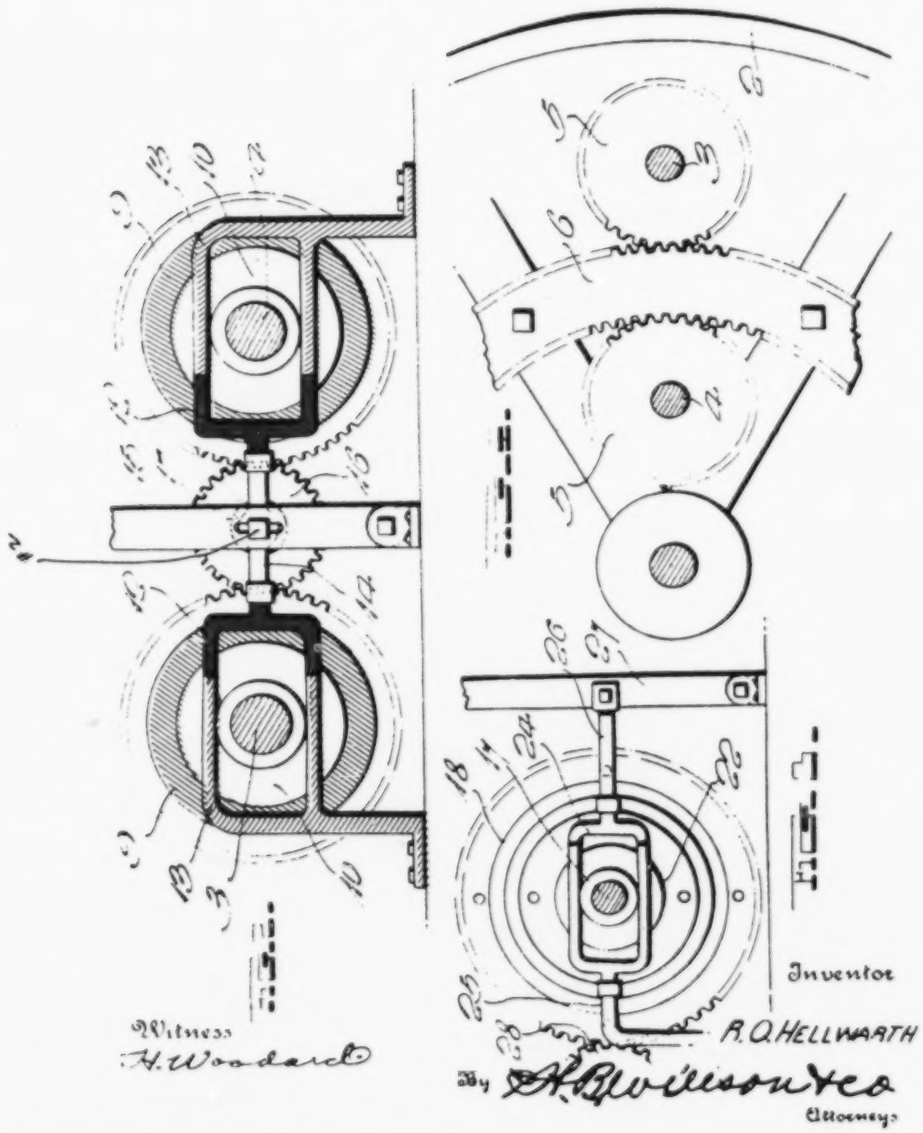
Inventor
R. O. HELLWARTH
By H. B. Wilson & Co
Attorneys

Oct. 9, 1923. 1,470,078

R. O. HELLWARTH

TRANSMIS ION MECHANISM

Filed Sept. 25, 1922 4 Sheets-Sheet 2



Witness
H. Woodard

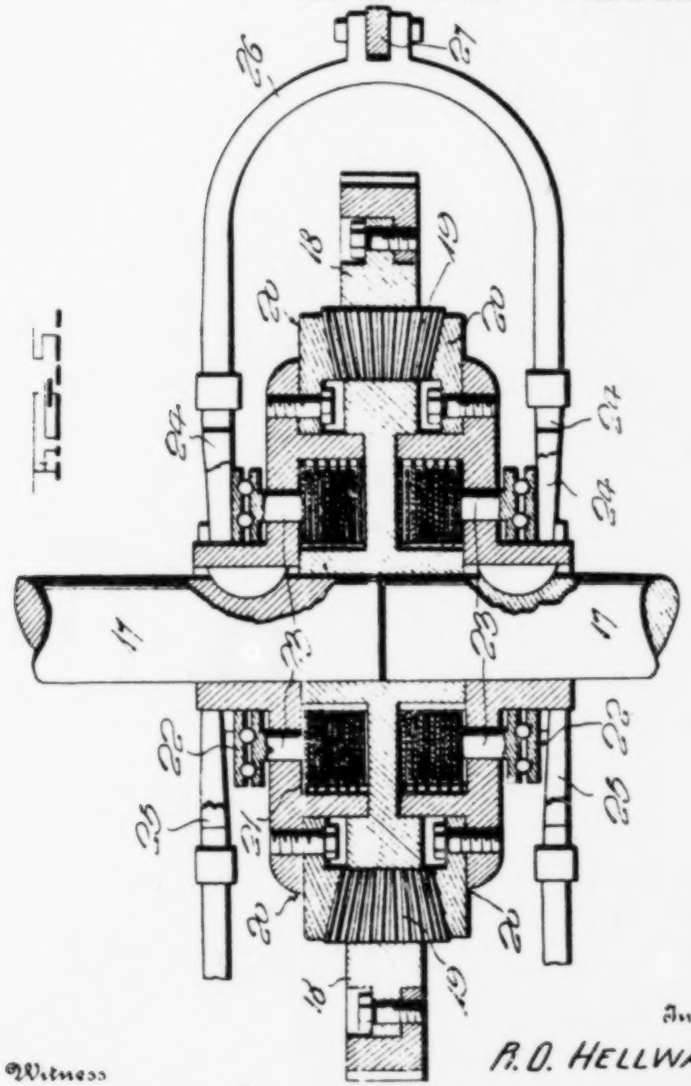
Inventor
R. O. HELLWARTH
By H. B. Wilson & Co
Attorneys

Oct. 9, 1923. 1,470,078

R. O. HELLWARTH

TRANSMISSION MECHANISM

Filed Sept. 25, 1922 4 Sheets-Sheet 3



Witness
H. Woodard

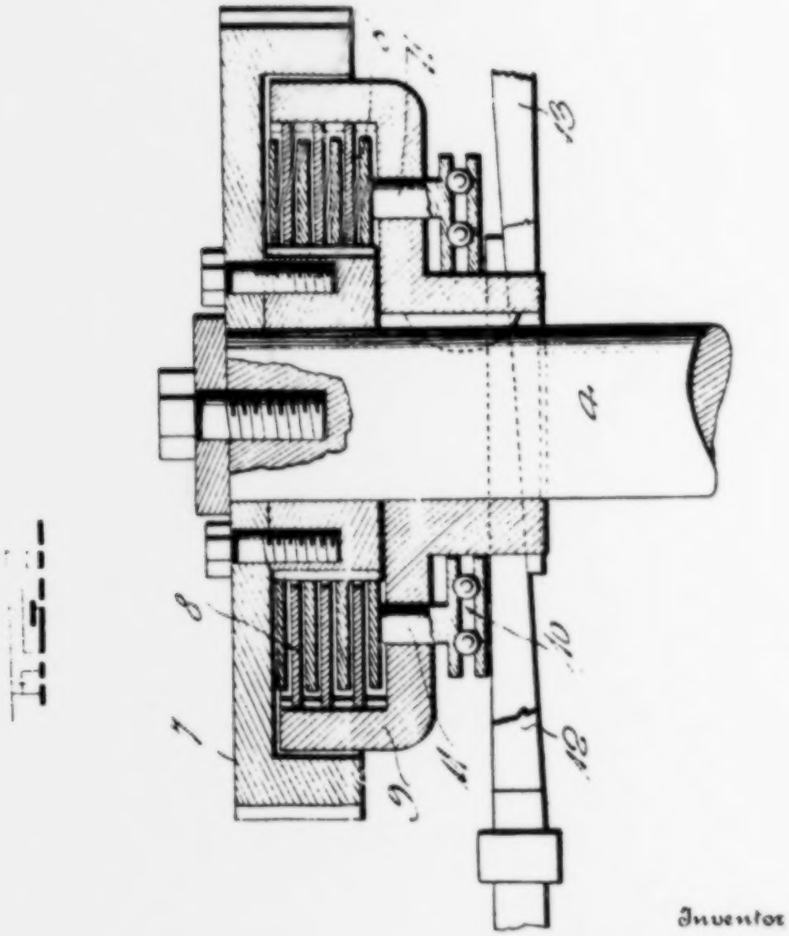
Inventor
R. O. HELLWARTH
By A. R. Williamson & Co
Attorney

Oct. 9, 1923. 1,470,078

R. O. HELLWARTH

TRANSMISSION MECHANISM

Filed Sept. 25, 1922 4 Sheets-Sheet 4



Witness
H. Woodard

Inventor
R. O. HELLWARTH
By A. R. Williamson & Co
Attorney

Patented Oct. 9, 1923. **1,470,078**

UNITED STATES PATENT OFFICE.

RUSSELL O. HELLWARTH, OF CELINA, OHIO.

TRANSMISSION MECHANISM.

Application filed September 25, 1922. Serial No. 590,510.

To all whom it may concern:

Be it known that I, RUSSELL O. HELLWARTH, a citizen of the United States, residing at Celina, in the county of Mercer and State of Ohio, have invented certain new and useful Improvements in Transmission Mechanisms; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in transmission mechanisms such as those designed primarily for use upon tractors, although usable also for trucks and other forms of machines.

The transmission is of the type adapted for driving right and left hand traction wheels or tread chains in reverse directions to produce abrupt steering or turning and the principal object is to provide a mechanism of this character having a differential driving mechanism which permits relative speed changes of the right and left hand traction members during ordinary steering with a suitable steering gear, but provided with means whereby the differential may be locked when abrupt turning is to be effected, whereby after setting suitable controls for the transmission units of the right and left hand traction members, one of the members may be positively driven forwardly while the other is similarly driven in the reverse direction, whereby the machine may be turned completely around or to any desired extent.

In carrying out the above ends, I provide a forward driving and a rearward driving shaft for each of the traction members and a further object is to provide a novel arrangement of parts whereby either shaft may be operatively connected with the differential mechanism and the other shaft simultaneously disconnected therefrom.

Still further objects are to provide a novel form of differential lock and to provide a conveniently located power take-off pulley which may be driven at will from the differential mechanism, without the necessity of driving the transmission mechanism.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a plan view of a transmission mechanism constructed in accordance with my invention, showing one manner of applying the same to a tractor.

Figures 2, 3 and 4 are vertical longitudinal sectional views as indicated by the lines 2—2, 3—3 and 4—4 of Fig. 1, respectively.

Figure 5 is an enlarged horizontal sectional view through the differential mechanism and its locking means.

Figure 6 is an enlarged horizontal section through one of the clutches which are used for connecting the forward and rearward driving shafts operatively with the differential mechanism.

In the drawings above briefly described, the numeral 1 designates a tractor frame shown more or less diagrammatically, said frame being provided with right and left hand traction members which are here shown in the form of wheels 2, although endless tread chains might well be employed instead. I provide independent driving units for the two traction members each including a forward driving shaft 3 and a rearward driving shaft 4, the two shafts being disposed in parallel relation and having bull pinions 5 on their outer ends connecting with the teeth on the inner and outer peripheries of a bull ring 6, one of these rings being secured to each traction member 2. Spur gears 7 are loosely mounted upon the inner ends of the shafts 3 and 4 and suitable clutches, such as the disc clutch 8 detailed in Fig. 6, are employed for locking said gears to their respective shafts. Each of these clutches includes a shell 9 keyed upon the shaft, a ball bearing thrust collar 10 around the hub of the shell, and studs 11 extending from this collar through the shell to move the clutch discs which are contained within said shell, into operative engagement with each other. Forked wedges 12 cooperating with ridged forked thrust members 13 carried by the frame 1, are employed to force the collar 10 inwardly to operative position, and the wedges 12 of each driving unit are preferably carried by opposite ends of a common operating rod 14, the arrangement being such that when this rod is shifted, for instance by the hand lever 15, or any other suitable means of control, to throw the clutch 8 of the shaft 3 into play, the clutch of the shaft 4 will be simultaneously thrown out. Thus, it will be seen that the bull pinions 5 may be controlled to drive the traction members 2 in

either direction and as separate controls are provided for the two traction units, one traction member may be driven forwardly and the other reversely, to produce abrupt turning.

The gears 7 of the two driving units mesh with opposite sides of driving pinions 16 carried by the ends of shaft sections 17 which are connected by a differential mechanism detailed more particularly in Fig. 5. In this view, the numeral 18 designates a central floating driving ring carrying the usual radially disposed bevelled pinions 19 which mesh with the teeth of a pair of bevelled gears 20 which are keyed upon the shaft sections 17. The action of this arrangement is well known to produce relative speed changes of the two sections 17, for instance when one must travel faster than the other for ordinary steering, by means of a suitable steering gear (not shown). When the traction members 2 are employed for steering however it is necessary that the differential be locked so that the two shaft sections 17 will rotate as a single shaft. To obtain this result, I prefer to confine a pair of disc clutches 21 between the gears 20 and web of the floating gear 18. To operate these clutches, I provide clutch collars 22 at the ends of the differential mechanism, said collars being preferably of the ball bearing type and having studs 23 which extend through the gears 20 to move the clutch discs into operative relation with each other. For simultaneously operating both collars 22 to throw the clutches 21 into play, I provide two forked wedges 24 straddling the hubs of the gears 20 and contacting with the outer sides of said collars, said wedges 24 being cooperable with fixed thrust forks 25. The two wedges 24 are preferably carried by the ends of a U-shaped yoke 26 suitably connected with a hand lever or the like 27 and it will be understood that the arms of the yoke are jointed to permit the wedges 24 to move inwardly to some extent when forcing the collars 22 to operative position.

Any preferred means could of course be connected with the driving gear 18 for operating the differential mechanism, but this gear is preferably of the spur type meshing with a similar gear 28 on a transverse jack shaft 29 having a power take off pulley 30. By suitable means not shown, the gear 28 may be moved out of mesh with the gear 18 when only the pulley is to be used, without moving the machine forwardly or rearwardly. For rotating the shaft 29, I have shown suitable engine driven shaft 31 and variable speed gearing 32.

By providing the construction shown and described or substantially this construction, a very advantageous machine is provided. It will be seen that when the machine is being driven for instance along the roadway and the usual steering gear (not shown) is employed, the differential mechanism will remain free so as to allow any necessary variations in the speed of the two traction members 2, thereby producing easy steering. If an abrupt turn is to be made, however, the traction members 2 may be driven in opposite directions, by operating the levers 15 to set the clutches 8 so that the forward driving shaft 3 of one traction member operates and the rearward driving shaft 4 of the other traction members comes into play. Thus, the machine may be turned directly around or to any desired extent, it being understood however that before this turning operation will be carried out, it is necessary to lock the differential mechanism by shifting the lever 27 to throw the clutches 21 into play. In some instances, it may be desirable to drive one traction member either forwardly or rearwardly while having the other member free of all driving connections. When this is desired, the clutches 8 of one of the driving units may be set in a neutral position while one of the clutches of the other unit is thrown into play.

As excellent results may be obtained from the general arrangement shown and described, it is preferably followed, but within the scope of the invention as claimed, numerous minor changes may of course be made.

I claim:

1. A transmission mechanism comprising two transmission units adapted to be connected respectively to right and left traction members, each of said units including a forward driving shaft and a rearward driving shaft, an endless traction member carried element having a portion extending between said shafts and having operative connection therewith and means whereby either shaft may be thrown into play for imparting movement to the traction member, a differential, and mechanism associated with the differential for driving said transmission units at the same speed, regardless of the direction of drive.

2. A transmission mechanism comprising two transmission units adapted to be connected respectively to right and left traction members, each of said units including a forward driving shaft, a rearward driving shaft, an endless traction member carried element having a portion passing between said drive shafts and having operative connection therewith, gears loose upon said shafts respectively, and means for clutching either gear to its respective shaft while permitting the other gear to run free; a pair of shaft sections having gears meshing with said loose gears, a driven mechanism connecting said shaft sections and permitting

relative speed changing thereof when steering, and means for locking said shaft sections together for rotation in unison at the same speed when desired.

3. A structure as specified in claim 2; said means for clutching either gear to its respective shaft comprising a wedge operated clutch for each gear, and a single movable member carrying the wedges for both clutches.

4. A transmission mechanism comprising a pair of internally and externally toothed bull rings adapted to be secured to right and left hand traction members respectively, inner and outer bull pinions meshing respectively with the inner and outer teeth of said bull rings, and means for driving both outer or both inner bull pinions simultaneously in the same direction, or for simultaneously driving one outer and one inner bull pinion in opposite directions.

5. The structure of claim 4 having the bull pinions mounted upon shafts, and means for imparting rotary movement to the shafts including clutch elements and means for causing movement of the clutch elements into and out of position causing rotation of the bull pinion carrying shafts.

In testimony whereof I have hereunto affixed my signature.

RUSSELL O. HELLWARTH.

STEERING STRUCTURE FOR FARM IMPLEMENTS AND THE LIKE

Filed June 18, 1956 4 Sheets-Sheet 1

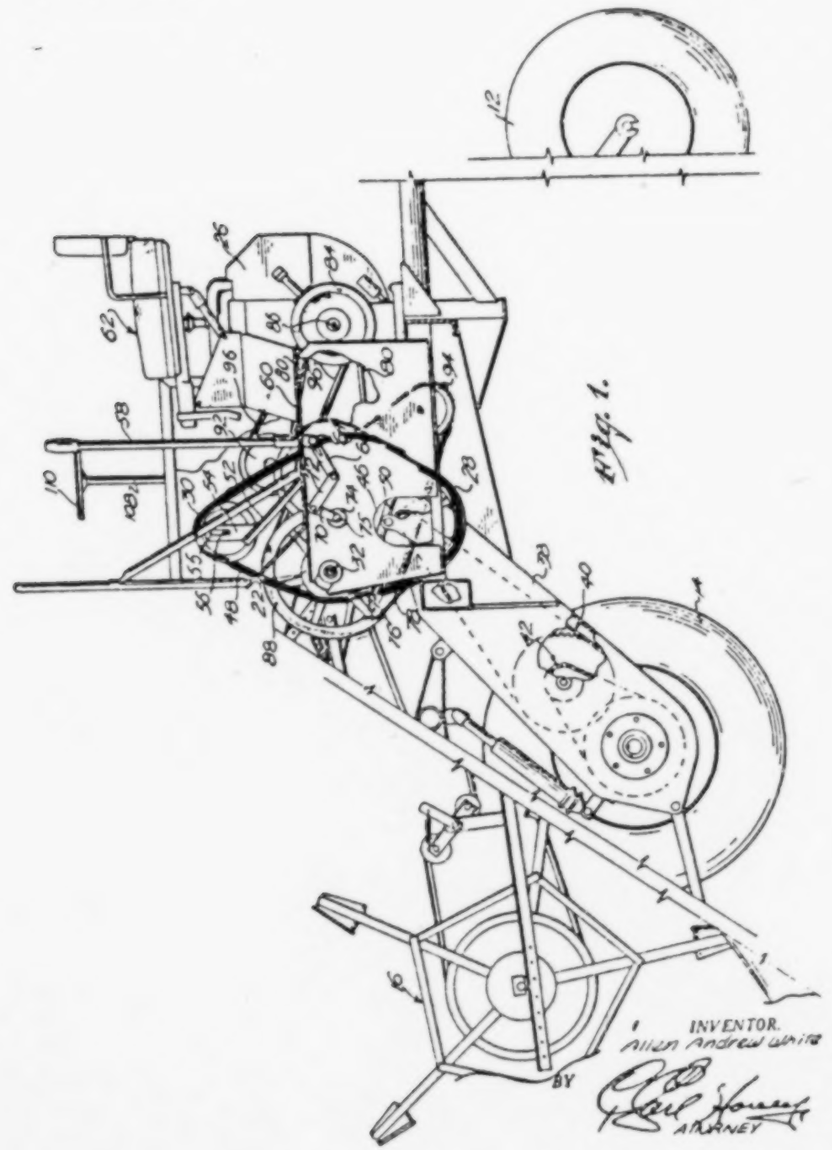


Fig. 1.

INVENTOR.
Allen Andrew White
BY
Earl Hoover
ATTORNEY

May 17, 1960 A. A. WHITE 2,936,840

STEERING STRUCTURE FOR FARM IMPLEMENTS AND THE LIKE

Filed June 18, 1956 4 Sheets-Sheet 2

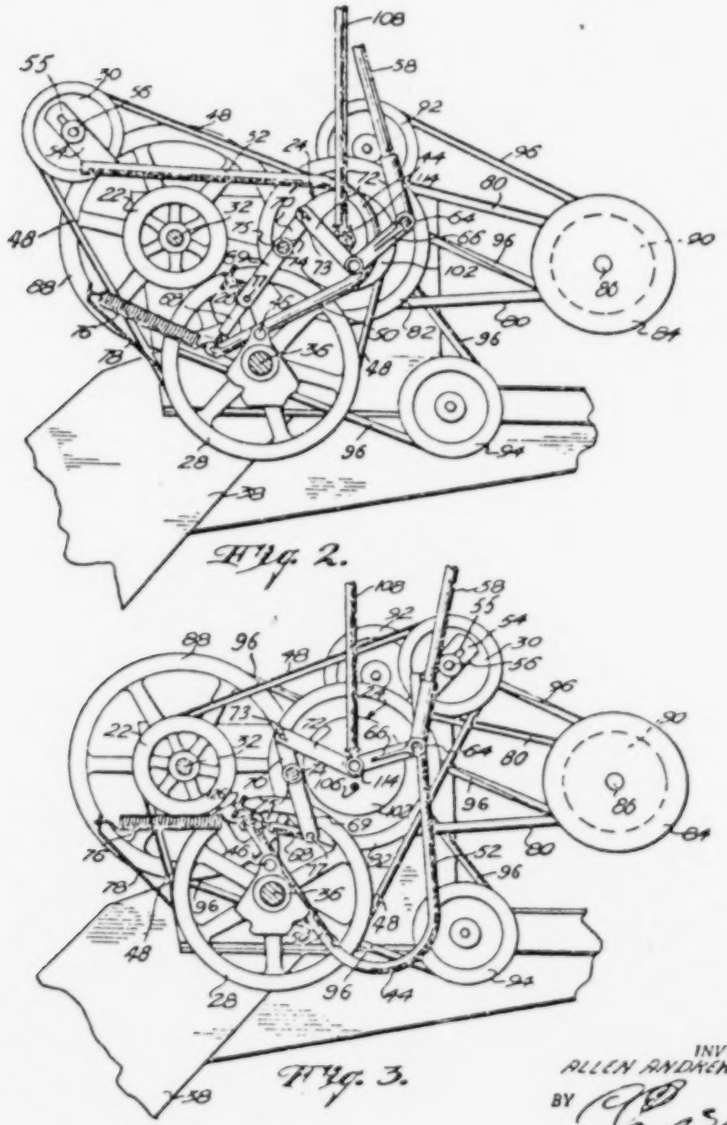


Fig. 2.

Fig. 3.

INVENTOR
ALLEN ANDREW WHITE
BY Paul Howard
ATTORNEY

May 17, 1960 A. A. WHITE 2,936,840

STEERING STRUCTURE FOR FARM IMPLEMENTS AND THE LIKE

Filed June 18, 1956 4 Sheets-Sheet 3

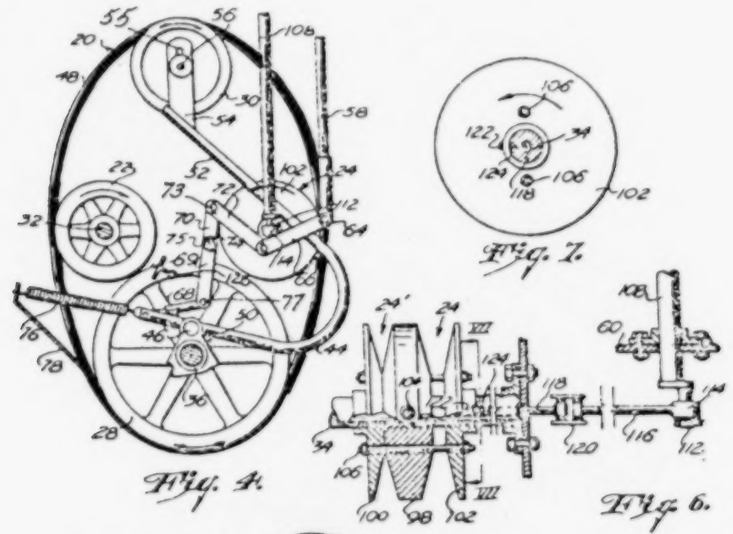


Fig. 4.

Fig. 7.

Fig. 6.

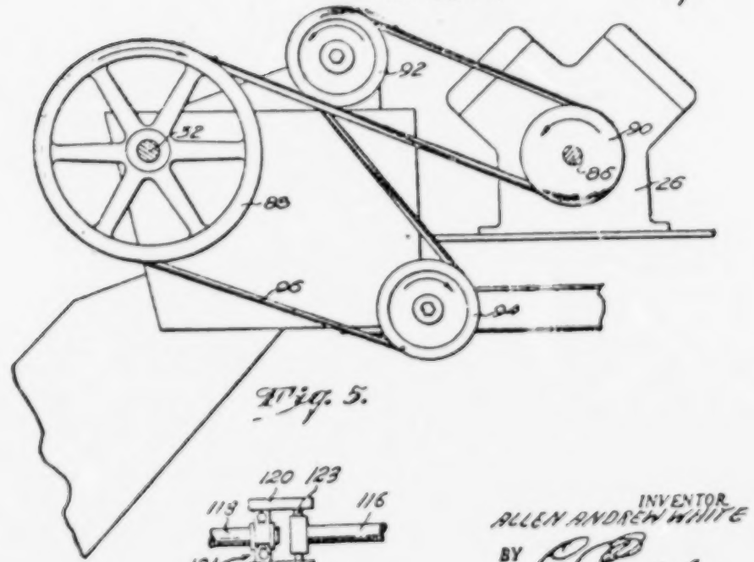


Fig. 5.

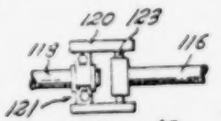


Fig. 12.

INVENTOR
ALLEN ANDREW WHITE
BY Paul Howard
ATTORNEY

May 17, 1960 A. A. WHITE 2,936,840

STEERING STRUCTURE FOR FARM IMPLEMENTS AND THE LIKE

Filed June 18, 1956 4 Sheets-Sheet 4

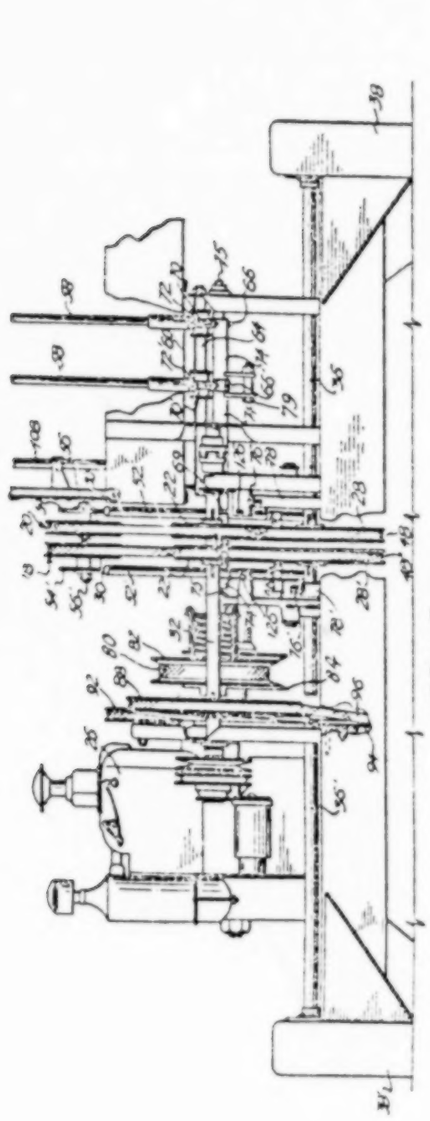


Fig. 8.

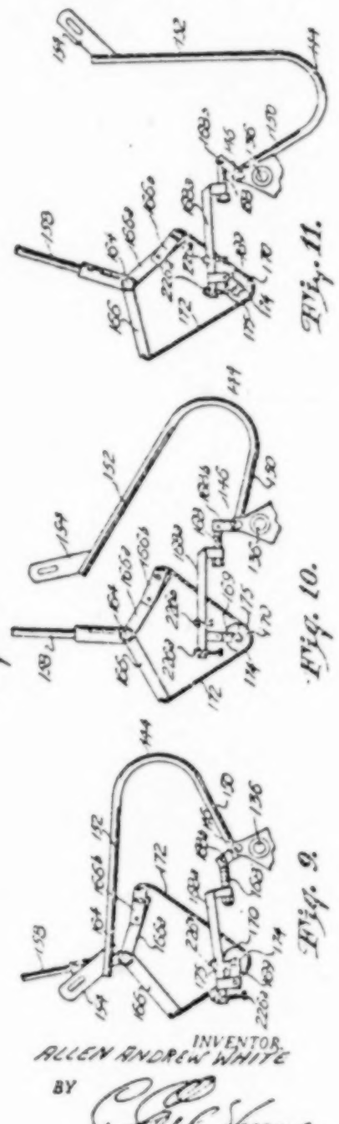


Fig. 10.

Fig. 9.

Fig. 11.

INVENTOR
ALLEN ANDREW WHITE
BY
ATTORNEY

United States Patent Office 2,936,840 Patented May 17, 1960

2,936,840

STEERING STRUCTURE FOR FARM IMPLEMENTS AND THE LIKE

Allen Andrew White, Peabody, Kans., assignor to Hesston Manufacturing Co., Inc., Hesston, Kans., a corporation of Kansas

Application June 18, 1956, Serial No. 592,083

13 Claims. (Cl. 180—6.66)

This invention relates to power transmission mechanism having many useful purposes, but adapted particularly for steering a mobile vehicle as power is transmitted to ground-engaging wheels for the primary purpose of advancing the vehicle or causing the same to move in reverse, the most important object being to permit driving of either of a pair of ground wheels, or both, at the will of the operator so that relatively sharp turns may be executed with ease and facility and so that the vehicle may be guided and maneuvered along any desired path of travel.

It is a primary object of the instant invention to provide power transmission in the nature of steering structure that is especially adapted for use in connection with farm implements and including as a part thereof duplicate belt and pulley units under direct control of the operator through manually manipulable levers to the end that as the levers are swung through predetermined paths of travel, the implement is caused to move forwardly or in reverse and along straight or curved paths of travel as may be desired or become necessary when the implement is placed in use.

Another important object of the present invention is the provision of power transmission mechanism having a driven member that is rotated in either of two directions, depending upon the position of a continuous belt with respect to a pair of oppositely rotating driving elements, the said belt being moved to opposite ends of its path of travel through the medium of a swingable idler operably connected with a manually manipulable lever as aforementioned.

Still another important object of the present invention is the provision of power transmission mechanism having spaced driving elements as aforementioned operable to alternately rotate the said driven member as the continuous flexible device, such as a belt, is swung into engagement with the selected drive element and held in a taut condition thereagainst.

A further object of the instant invention is the provision in a power transmission of the aforementioned character of novel support means for the swingable idler pulley which support is in turn capable of yieldably maintaining the continuous belt in a taut condition when the same operably engages one of the drive elements by virtue of the fact that such support is U-shaped and of resilient material.

A still further object of the instant invention is to incorporate with said resilient support for the idler pulley and with the manually manipulable lever, toggle linkage or the like capable of releasably holding the idler pulley in at least one of its operative positions against a stop, for example, until the operator is desirous of manipulating the lever to vary the speed of the corresponding ground wheel, or place the same in neutral or reverse.

It is an aim of the invention illustrated in the drawings and about to be described to provide additionally in connection with the power transmission mechanism and steering structure above outlined, a fine adjustment or auxiliary steering mechanism capable of permitting maneuvering of the vehicle at least while the same moves in one direction without necessity of operating either of the two primary steering levers.

Another aim of the present invenuon is the provision of a variable speed pulley constituting one of the drive members of one of the primary power transmission mechanisms together with manually operable means connected with the variable speed pulley for permitting limited steering of the vehicle while the two primary control levers are set in one position with their corresponding idler pulley at one end of its path of travel.

Other aims and objects relate to important details of construction and advantageous features, all of which will be made clear or become apparent as the following specification progresses, reference being had to the accompanying drawings wherein:

Figure 1 is a fragmentary side-elevational view of one type of farm implement with which the instant invention is adapted to be used, parts being broken away to reveal details of construction of the novel steering structure in the nature of power transmission mechanism;

Fig. 2 is an enlarged fragmentary view similar to Fig. 1 and partially in section illustratng the position of parts when both steering levers are at the forwardmost ends of their paths of travel;

Fig. 3 is a view similar to Fig. 2 showing the relative position of parts when the two steering levers are at the rearmost ends of their paths of travel;

Fig. 4 is a fragmentary, vertical, cross-sectional view showing one of the power transmission mechanisms in a neutral position as in Fig. 1;

Fig. 5 is a substantially vertical cross-sectional view showing in elevation the operable connection between the prime mover and one of the driven elements of the two primary power transmission mechanisms;

Fig. 6 is a fragmentary elevational view of the fine-line steering structure illustrating the other drive members of the mechanisms, one of which is in the nature of a variable speed pulley, parts being broken away and in section for clearness;

Fig. 7 is a fragmentary detailed cross-sectional view taken on line VII—VII of Fig. 6;

Fig. 8 is a fragmentary front-elevational view of the steering structure of the implement shown in Fig. 1;

Fig. 9 is an elevational view similar in parts to Fig. 4, showing a modified form of connection between one of the steering levers and its corresponding idler pulley support with the said lever at one end of its path of travel;

Fig. 10 is a view similar to Fig. 9 showing the manual control lever in neutral;

Fig. 11 is a view similar to Figs. 9 and 10 illustrating the control lever at the opposite end of its path of travel; and

Fig. 12 is an enlarged view of the joint shown in Fig. 6.

The implement chosen for illustration of the principles of the instant invention and included in part by Figs. 1 and 8 of the drawings, is in the nature of a swather supported in its entirety by a rear caster wheel 12 and a pair of opposed ground-engaging drive wheels, one only of which is illustrated in Fig. 1 and designated by the numeral 14. The implement includes as a part thereof a sickle bar and platform (not shown) above which is rotatably disposed a conventional reel 16, but inasmuch as the improvements about to be described may be employed in connection with virtually any mobile vehicle, or wherever power transmission is needed, no further details of construction or operation of the implement shown in Figs. 1 and 8 need be set forth.

The steering structure for driving the wheels 14 either

forwardly or in reverse includes a pair of primary power transmission mechanisms broadly designated by the numerals 18 and 20, and inasmuch as they are substantially identical, the unit 20 only as illustrated in Figs. 1–4, inclusive, will be described. Where duplicate parts on opposite sides are provided, such parts will bear similar numbers with one set of numbers being primed. For ease in description, only one set of numbers will be specifically referred to.

Referring especially to Fig. 4 of the drawings, the power transmission mechanism 20 includes a pair of horizontally spaced drive elements 22 and 24 that constantly rotate in opposite directions when driven by prime mover 26. A driven member 28 is disposed beneath the elements 22 and 24, preferably within a vertical plane midway between the elements 22 and 24 and an idler member 30 is spaced directly above the member 28 and above the elements 22 and 24 when the member 30 is in the neutral position shown in Fig. 4 of the drawings.

Elements 22 and 24 are secured directly to shafts 32 and 34, respectively, for rotation therewith, it being understood that the drive elements 22' and 24' of mechanism 18 are likewise secured to shafts 32 and 34 respectively, for rotation therewith.

Driven member 28 is, on the other hand, attached directly to a shaft 36 operably connected with corresponding wheel 14 through the medium of structure contained within housing 38 (see Fig. 1). Such structure may consist of a pair of operably connected chain and sprocket wheel assemblies broadly designated by the numerals 40 and 42.

Looking again to Fig. 4 of the drawings, the idler member 30 is mounted on a U-shaped support 44 that is in turn swingably carried by the frame of the implement adjacent the shaft 36 by a pivot pin 46. A continuous flexible device 48 such as a belt is trained over the elements 22 and 24 and the members 28 and 30.

The drive elements 22 and 24, the driven member 28 and the idler member 30 are all preferably in the nature of pulleys disposed within a common vertical plane as seen in Fig. 8 of the drawings. Consequently, it is seen that the axes of rotation of shafts 32, 34 and 36, as well as the axis of rotation of idler pulley 30 and the axis of swinging movement of support 44 about pivot pin 46 are horizontal and in parallelism.

The support 44 for idler pulley 30 is preferably in the nature of a resilient U-shaped loop having a lower leg 50 and an upper leg 52. The lower leg 50 is carried by the pivot pin 46 whereas upper leg 52 receives the idler pulley 30 through the medium of a laterally extending bracket 54 that is slotted at 55 to adjustably receive stub shaft 56 of the idler pulley 30. The tension of the belt 48 in either of the two positions of the idler pulley 30 shown in Figs. 2 and 3 may, therefore, be varied by shifting the idler pulley 30 with respect to the bracket 54 toward and away from the pivot pin 46.

The idler pulley 30 is swung through its path of travel about the horizontal axis of pivot pin 46 through the medium of a manually manipulable lever 58 that extends upwardly through platform 60 of the implement forwardly of the operator's seat 62. The lowermost end of the levers 58 and 58' are rotatably or hingedly mounted on a single, stationary horizontal shaft 64 disposed beneath the platform 60 and extending toward the mechanism 20. A lateral extension 66 is rigid to the lowermost end of the lever 58 for swinging movement therewith as a unit.

Toggle linkage operably interconnecting the extension 66 and the lower leg 50 of loop 44 includes element 68 and links 69, 70 and 72, the link 70 being adjacent lever 58 beneath platform 60 and rigidly secured to a rotatable tube 74. Link 72, disposed below platform 60, has one end pivotally connected to the uppermost end of the link 70 as at 73 and its other end with the outermost end of the extension 66, whereas the element 68 has one end

pivotally connected to the forwardmost end of the leg 50 and its other end to the lowermost end of the link 69 as at 77, link 69 being transversely spaced from link 70 and link 69 also being rigid to tube 74. It is to be noted that for purposes of adjustment, the element 68 is extensible. A spring 76 connects the forwardmost free end of the leg 50 with a bracket 78 that is in turn carried by the framework of the implement. Tube 74 comprises two portions each of which, as shown in Fig. 8, is telescoped on a rotatable shaft 75, one on each side of the lever 58. Shaft 75, to which lever 58' is rigidly secured, has transversely-spaced links 69' and 70' affixed thereto so that movement of lever 58' rotates shaft 75 and the affixed links 69' and 70'. As shown in Fig. 8, the two portions of tube 74 are rigidly connected together by a coupling 79 which bridges link 70' and lever 58' so that swinging movement of lever 58 is transmitted to support 44 by means of the rigidly interconnected portions of tube 74. Link 70 is rigid to tube 74 on one side of coupling 79 and link 69 is rigid to tube 74 on the opposite side of coupling 79.

During operation of the primer mover 26, the drive pulley 24 is driven in the direction of the arrow shown in Fig. 4 through the medium of a continuous belt 80 (Figs. 2, 3 and 8) trained over pulleys 82 and 84, secured to shaft 34 and power shaft 86, respectively, the latter of which is the drive shaft of prime mover 26 as seen in Fig. 5. The drive pulley 22 is, however, driven in the opposite direction as shown by the arrow in Fig. 4 from the prime mover 26 through the medium of the arrangement shown in Fig. 5 of the drawing. To this end, pulleys 88 and 90 are affixed to shafts 32 and 86, respectively, and the frame of the implement carries a pair of idler pulleys 92 and 94. A continuous belt 96 is trained over the pulleys 88, 90, 92 and 94, it being seen in Fig. 8 that the pulleys 92 and 94 are offset in opposite directions with respect to two aligned pulleys 88 and 90 for preventing undue wear in the belt 96 which would otherwise occur by stretches thereof rubbing together at the point of crossing adjacent the pulley 92.

Secondary steering control structure operable in conjunction with the primary power transmission mechanisms 18 and 20 is best seen in Figs. 6 and 7 of the drawings. In this connection, the drive pulleys 24 and 24' are in the nature of a composite unit, including a center section 98 and a pair of outermost sections 100 and 102. The center section 98 is secured to the shaft 34 for rotation therewith through the medium of a set screw or the like 104, and the sections 100—102 are interconnected by a plurality of bolts 106 slidable in section 98.

The sections 100 and 102 are reciprocable or slidable on the shaft 34 toward and away from the center section 98, preventing the pulleys 24 and 24' of varying diameters, to drive the belts 48—48' and, therefore, the pulleys 28—28' at varying speeds when the belts 48—48' are in operative engagement with the pulleys 24—24' as shown in Fig. 2 of the drawings. The pressure of belts 48—48' on pulleys 24—24' keeps sections 100—102 in proper relationship.

A steering post 108 extending upwardly through the platform 60 to one side of the steering levers 58 and 58' carries a steering wheel 110 on the uppermost end thereof and an eccentrically disposed stub shaft 112 on its lowermost end. A collar or bearing 114 on one end of a shaft 116 is rotatable on the stub shaft 112 and couples with a shaft 118 by a joint 120 having a bearing 121 for shaft 118. A pin 123 pivotally attaches shaft 116 to joint 120. The shaft 118 is rotatable within joint 120 and extends into the proximal end of the shaft 34 for reciprocation along the longitudinal, horizontal axis of rotation of shaft 34. Shaft 118 connects with the outer section 102 of pulley 24 through the medium of a set screw or the like 122. It is to be noted that the shaft 34 is provided with a short clearance slot 124 for the fastening means 122. The joint 120 not only permits

rotation of the shaft 118 with the shaft 34, and with respect to the shaft 116, but permits swinging of the latter with respect to the shaft 118 during rotation of the steering post 108 and, therefore, its depending stub shaft 112.

For clearness of illustration, both of the levers 58 and 58' are shown vertical in the neutral position in Fig. 4, both are shown swung forwardly in Fig. 2 and both are illustrated in Fig. 3 of the drawings retracted to the rearmost ends of their paths of travel toward the operator's seat 62. Fig. 1 of the drawing similarly shows the neutral position of both of the steering levers 58 and 58'.

In operation, it is clear that when the levers 58 and 58' are vertically disposed as shown in Figs. 1 and 4, belts 48 and 48' will be wrapped rather loosely around their corresponding pulleys 22—22', 24—24', 28—28', and 30—30'. Consequently, even during continuous operation of prime mover 26, driving both of the pulleys 22 and 22' clockwise, viewing Fig. 4, and rotating both pulleys 24 and 24' anticlockwise, viewing Fig. 4, no rotative movement will be imparted to the pulleys 28 and 28', and therefore, shafts 36 and 36' as well as corresponding wheels 14 remain motionless.

Manifestly, the speed of operation of the prime mover 26, preferably in the nature of a gasoline engine, may be varied through conventional throttle control means (not shown), but when the two power transmission mechanisms 18 and 20 are neutral, pulleys 22—22' are driven idly from power shaft 86 through pulley 90 and belt 96 which in turn drives pulley 88 and therefore the shaft 32 to which the two drive pulleys 22 and 22' are affixed. By the same token, the two pulleys 24—24' i.e., the composite unit shown in Fig. 6 of the drawings, will rotate idly with the shaft 34 as the latter is driven directly from the shaft 86 through pulleys 82 and 84 and belt 80.

When it is desired to move forwardly in a straight line, the steering wheel 110 is first rotated to in turn rotate the post 108, swing the stub shaft 112, and shift the shafts 116 and 118 to the left, viewing Fig. 6. As the shaft 118 slides inwardly with respect to the shaft 34 and as the fastener 122 slides along the slot 124, the pulley section 102 is moved toward the center section 98 as it slides on the shaft 34. With the diameters of the pulleys 24 and 24' thus equalized, belts 48 and 48', respectively, will be driven at the same rates of speed when such belts are brought into engagement with their corresponding pulleys 24 and 24'.

This is accomplished by swinging both of the levers 58 and 58' forwardly to the forwardmost ends of their paths of travel as illustrated in Fig. 2 of the drawings. It is seen by viewing Figs. 2 and 4 that such swinging movement of lever 58 about the shaft 64 anticlockwise swings the extension 66 downwardly and rearwardly. Extension 66 exerts a pull upon the link 72 which in turn, by virtue of its pivotal connection with the link 70, rotates the tube 74 clockwise. As the lowermost end of the link 69 swings upwardly and forwardly, the distance between tube 74 and the outermost, forwardmost end of the leg 50 is increased. The supporting loop 44 for the idler pulley 30 is thereby swung anticlockwise about the axis of pivot pin 46 and against the action of spring 76.

The links 68 and 69 are permitted to swing slightly beyond center, i.e., beyond a straight line connecting tube 74 and the outermost free end of the leg 50 before striking an adjustable stop 126. The idler pulley 30 is therefore releasably held in the position shown in Fig. 2 of the drawings permitting the operator to release his grip on the lever 58.

It is seen in Fig. 2 of the drawings that when the pulley 30 is disposed at the forwardmost end of its path of travel, belt 48 is brought against the pulley 24 and swung away from the pulley 22, the latter continuing to rotate clockwise, viewing Fig. 2, without any effect upon the ground wheels 14. Rotation of the shaft 34, and therefore the pulley 102, causes rotation of the drive pulley 28 and, of course, the idler pulley 30 anticlockwise

which drives the shaft 36 to rotate the wheel 14 that can be seen in Fig. 1 through the interconnection 40—42 between shaft 36 and the wheel 14. By the same token, when the lever 55' is also at the forwardmost end of its path of travel, belt 48' will be driven from pulley 24' to in turn rotate the shaft 36' and a corresponding wheel 14 forwardly in the same direction as the wheel 14 shown in Fig. 1 is driven.

At any time the operator positioned on seat 62 desires to manipulate a turn or guide the implement to the left or to the right, it is but necessary but to manipulate the levers 58 and 58'. For example, while lever 58 is in the position shown in Fig. 2, the lever 58' might be retracted toward the seat 62, thereby releasing the tension of belt 48' on pulley 24', causing the implement to veer to the right because of the greater speed of travel of the wheel 14 shown in Fig. 1. In fact, if the lever 58' is moved to a neutral position as shown in Fig. 4 while the lever 58 is at the forwardmost end of its path of travel, in the manner illustrated by Fig. 2, the wheel corresponding to shaft 36' will no longer be driven and, by virtue of continued driving of the wheel 14 shown in Fig. 1, the implement will turn about a vertical axis and continue to rotate 360° if such is desired.

It is contemplated, however, that minor turning movements in the implement may be executed independently of the levers 58 and 58', and while the same are at the forwardmost ends of their paths of travel. This is accomplished by manipulation of the steering wheel 110 since the speed of rotation of the pulley 28 is increased as soon as the pulley section 102 is shifted away from the center section 98. It is contemplated that the pulleys 24 and 24' will be of substantially the same effective diameter when the pulley sections 100—102 are equally spaced from the section 98. Consequently, manipulation of the steering wheel 110 will cause the implement to veer to the right whenever the pulley sections 100—102 are retracted to increase the diameter of pulley 24 and decrease the diameter of pulley 24', and to the left whenever the pulley sections 100—102 are moved toward the pulley 82 to increase the diameter of pulley 24' and decrease the diameter of pulley 24.

It is manifest that levers 58 and 58' must be pulled toward the seat 62 to the neutral position shown in Figs. 1 and 4 before the implement can be placed in reverse. The reverse action is accomplished by retracting the levers 58 and 58' to the rearmost ends of their paths of travel as shown in Fig. 3 which causes the idler pulleys 30 and 30' to swing their corresponding belts 48 and 48' to a position engaging pulleys 22 and 22', respectively.

A safety factor is provided, as seen in Fig. 3 for reverse operation in that support 44 strikes shaft 36 before the extension 66 and link 72 are permitted to closely approach alignment. Accordingly, as soon as the levers 58 and 58' are released by the operator, the springs 75 and 76' automatically return both power transmission mechanisms 18 and 20 to the neutral position.

The fine-line steering shown in Fig. 6 of the drawings is ineffective and not believed necessary for reverse travel and such steering in reverse may be effected by manipulation of the levers 58 and 58' toward and away from the rearmost ends of their paths of travel.

The particular nature of the supports 44 -44' is extremely important. The formation thereof in substantially U-shaped loops and the utilization of somewhat resilient material in the manufacture thereof places a yieldable bias upon the corresponding idler pulleys 30 and 30' whenever the latter are either at the forwardmost or rearward ends of their paths of travel. Viewing Fig. 2, for example, it is seen that belt 48 is kept in a taut condition tightly engaging not only the drive pulley 24, but the driven pulley 28 and as the leg 52 tends to yield toward the leg 50, the resiliency within the bight of the loop 44 will tend to bias the pulley 30 upwardly and forwardly away from the pivot point 46, thereby main-

taining the belt 48 stretched to its limit provided, of course, that the pulley 30 is properly adjusted with respect to its supporting bracket 54. The same effect of the loop 44 upon the belt 48 is apparent in Fig. 3 when the idler pulley 30 is disposed to hold the belt 48 tightly against the drive pulley 22.

In Figs. 9 to 11, inclusive, there is shown a modified form of operable connection between manual lever 158 and support or loop 144 for an idler pulley (not shown) comparable to pulleys 30—30'. It is seen that U-shaped loop 144 is provided with a lower leg 150 and an upper leg 152, together with a slotted bracket 154 rigid to the leg 152 for receiving such idler pulley. The lower leg 150 of loop 144 is swingably supported by pivot pin 146 adjacent shaft 136 in much the same manner as above described with respect to the form illustrated in Figs. 1 to 8, inclusive. Similarly, the lever 158 is rotatable on shaft 164 and is provided with a lateral extension 166 rigid thereto.

Additionally, in the form shown in Figs. 9–11, there is provided a second lateral extension 166*a* rigid to lever 158 for rotation therewith and extending oppositely to the extension 166. The two extensions 166 and 166*a* are joined by a chain 172 that passes beneath a rotatable sprocket wheel 170 rigid to a tube 174 rotatable on shaft 175. The tube 174 has a short lateral extension 169 rigidly secured thereto which is in turn pivotally connected to an elongated arm 168*a* adjacent one end of the latter. The opposite end of the arm 168*a* is in turn adjustably and pivotally connected to an extension 168*b* rigid to the lowermost and forwardmost end of the leg 150 through the medium of a bolt or the like, 168. The tightness of the chain 172 may be varied through the medium of a plate 166*b* swingable on the extension 166*a* and to which one end of the chain 172 is attached. The limits of swinging movement of the lever 158 are determined by adjustable stops 226*a* and 226*b*, depending from the arm 168*a* and alternately engageable with the tube 174 as seen in Figs. 9 and 11. In all respects, however, the two power transmission mechanisms 18 and 20 operate essentially the same whether the toggle linkage shown, for example, in Fig. 4 is employed, or the connecting structure of Figs. 9 to 11, inclusive, is utilized.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In power transmission mechanism, a pair of horizontally spaced drive pulleys; a prime mover having a power shaft; means interconnecting the power shaft and one of the drive pulleys for rotating the latter in one direction; means interconnecting the power shaft and the other drive pulley for rotating the latter in the opposite direction; a driven pulley beneath the drive pulleys; a U-shaped, resilient loop having an upper and a lower leg, pivot means adjacent the driven pulley mounting the lower leg for swinging movement of the loop; an idler pulley normally disposed above the drive and driven pulleys within a vertical plane common thereto, said idler pulley being mounted on the upper leg for rotation on a horizontal axis parallel with the axes of rotation of the drive and driven pulleys and with the axis of swinging movement of said loop; a continuous belt trained over the pulleys; and manually manipulable structure connected with said loop for swinging the same to force the belt against either of said drive pulleys whereby to rotate the driven pulley in either direction.

2. In a power transmission, a frame; a pair of longitudinally spaced drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; and control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys.

3. In a power transmission, a frame; a pair of longitudinally spaced, horizontal drive shafts rotatably carried by the frame, a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame below the drive pulleys; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys above the latter; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; and control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley.

4. In a power transmission, a frame; a prime mover on the frame; a pair of longitudinally spaced drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame below the drive pulleys; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley; means coupling the prime mover with said one shaft for driving the latter continuously in one direction; and means coupling the prime mover with the other shaft for driving the latter continuously in the opposite direction.

5. In a power transmission, a frame; a pair of longitudinally spaced drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; a manual control lever; means mounting said lever on the frame for swinging movement in a plane substantially parallel with the plane of said pulleys and the plane of swinging movement of said support; and means coupling the lever with said support to swing the latter in response to swinging of the lever to thereby tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley.

6. In a power transmission, a frame; a prime mover on the frame; a pair of longitudinally spaced drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a support for the idler pulley; pivot means mounting the support on the frame for swinging movement about an axis substantially parallel with the axis of the pulleys; means rotatably mounting the idler pulley on the support; control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys; means coupling the prime mover with one of said shafts for driving the latter continuously in one direction; and means coupling the prime mover with the other shaft for driving the latter continuously in the opposite direction.

7. In a power transmission, a frame; a prime mover on the frame; a pair of longitudinally spaced, horizontal drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame below the drive pulleys; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys above the latter; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley; means coupling the prime mover with said one shaft for driving the latter continuously in one direction; and means coupling the prime mover with the other shaft for driving the latter continuously in the opposite direction.

8. In a power transmission, a frame; a pair of longitudinally spaced, horizontal drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame below the drive pulleys; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys above the latter; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; a manual control lever; means mounting said lever on the frame for swinging movement in a plane substantially parallel with the plane of said pulleys and the plane of swinging movement of said support; means coupling the lever with said support to swing the latter in response to swinging of the lever to thereby tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley.

9. In a power transmission, a frame; a prime mover on the frame, a pair of longitudinally spaced drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; a manual control lever; means mounting said lever on the frame for swinging movement in a plane substantially parallel with the plane of said pulleys and the plane of swinging movement of said support; means coupling the lever with said support to swing the latter in response to swinging of the lever to thereby tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley.

10. In a power transmission, a frame; a pair of longitudinally spaced drive shafts rotatably carried by the frame; a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a support for the idler pulley; pivot means mounting the support on the frame for swinging movement about an axis substantially parallel with the axis of the pulleys; means rotatably mounting the idler pulley on the support; a manual control lever; means mounting said lever on the frame for swinging movement in a plane substantially parallel with the plane of said pulleys and the plane of swinging movement of said support; and means coupling the lever with said support to swing the latter in response to swinging of the lever to thereby tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys, and being disposed to position said other leg substantially horizontally, overlying the shafts when the belt engages said drive pulley of said one shaft, and substantially vertically when the belt engages said other drive pulley.

11. In a vehicle having a frame, a prime mover on the frame, a pair of ground engaging wheels supporting the frame and a pair of longitudinally spaced drive shafts rotatably carried by the frame, a power transmission on the frame for each wheel respectively, each including a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a support for the idler pulley; pivot means mounting the support on the

frame for swinging movement about an axis substantially parallel with the axis of the pulleys; means rotatably mounting the idler pulley on the support; control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys; means coupling the prime mover with one of said shafts for driving the latter continuously in one direction; means coupling the prime mover with the other shaft for driving the latter continuously in the opposite direction; and structure coupling each wheel with its corresponding driven pulley.

12. In a vehicle having a frame, a pair of ground-engaging wheels supporting the frame and a pair of longitudinally spaced drive shafts rotatably carried by the frame, a power transmission on the frame for each wheel respectively, each including a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a support for the idler pulley; pivot means mounting the support on the frame for swinging movement about an axis substantially parallel with the axis of the pulleys; means rotatably mounting the idler pulley on the support; a manual control lever; means mounting said lever on the frame for swinging movement in a plane substantially parallel with the plane of said pulleys and the plane of swinging movement of said support; means coupling the lever with said support to swing the latter in response to swinging of the lever to thereby tighten the belt against either of said drive pulleys; and structure coupling each wheel with its corresponding driven pulley.

13. In a vehicle having a frame, a pair of ground-

engaging wheels supporting the frame and a pair of longitudinally spaced drive shafts rotatably carried by the frame, a power transmission on the frame for each wheel respectively, each including a drive pulley secured to each shaft respectively; a driven pulley rotatably carried by the frame; an idler pulley spaced from the driven pulley and coplanar with the latter and with the drive pulleys; a continuous, normally stationary belt trained around the pulleys; a substantially U-shaped support for the idler pulley normally looped around one of said shafts and having a pair of legs and a bight; pivot means mounting one of said legs on the frame for swinging movement of the support about an axis substantially parallel with the axes of the pulleys; means rotatably mounting the idler pulley on the other of said legs; control means carried by the frame and coupled with said support for swinging the latter to tighten the belt against either of said drive pulleys, said pivot means being disposed to position said bight in close looped relationship to said one shaft when the belt engages the drive pulley of the latter and remote from said one shaft when the belt engages the other of said drive pulleys; and structure coupling each wheel with its corresponding driven pulley.

References Cited in the file of this patent

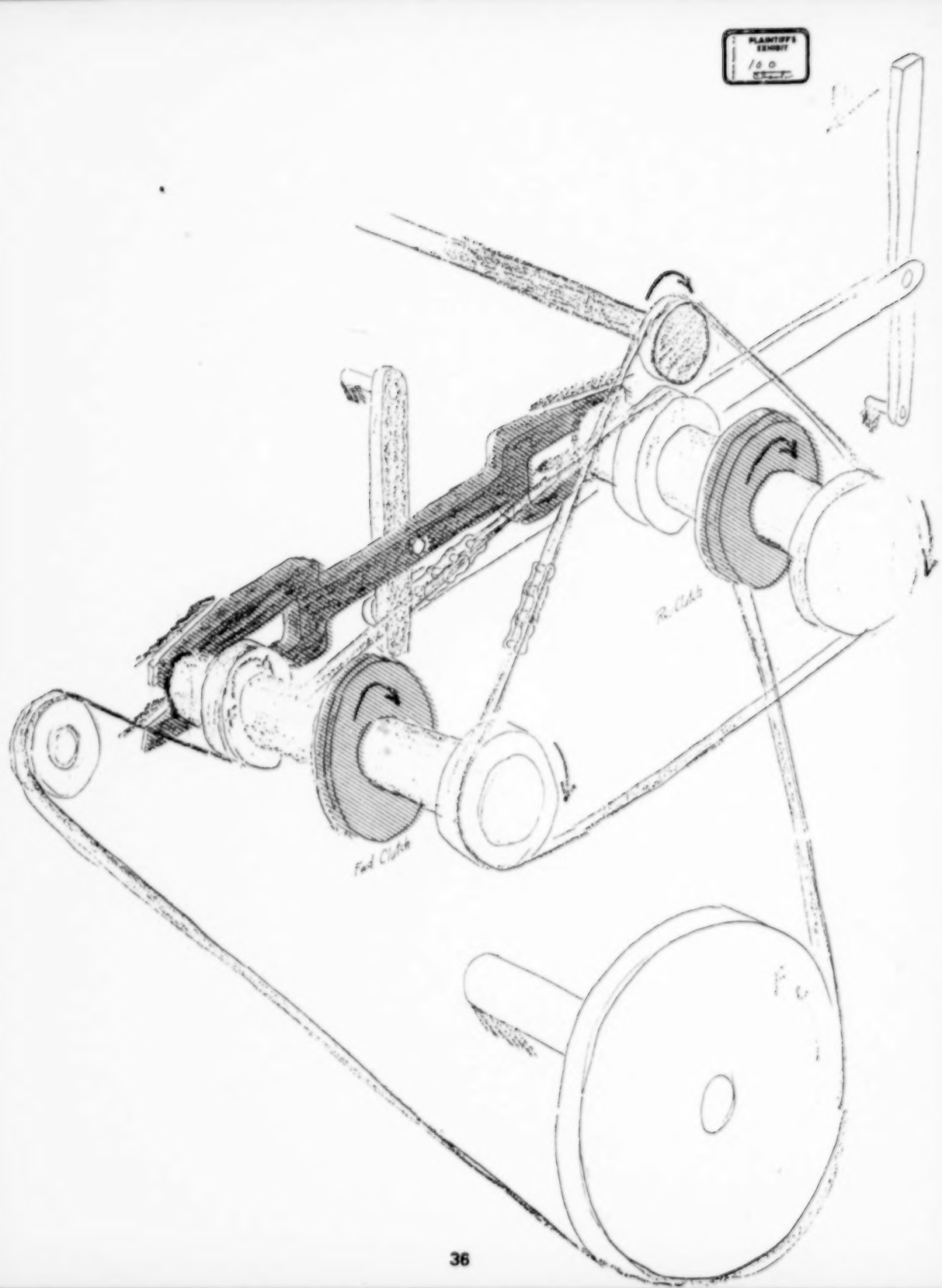
UNITED STATES PATENTS

2,311,393	Honeywell	Feb. 16, 1943
2,329,372	Hitch	Sept. 14, 1943
2,450,262	Winslow et al.	Sept. 28, 1948

FOREIGN PATENTS

172,528	Austria	Sept. 25, 1952

PLAINTIFF'S EXHIBIT 100



Supreme Court, U. S.
FILED
JUN 16 1978
MICHAEL RODAK, JR., CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1977

No. 77-1640

CLARK EQUIPMENT COMPANY,
Petitioner,

versus

LOUIS J. KELLER and CYRIL N. KELLER,
Respondents.

RESPONDENTS' BRIEF IN OPPOSITION TO PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

MALCOLM L. MOORE
HERMAN H. BAINS
WILLIAMSON, BAINS, MOORE & HANSEN
465 Pillsbury Building
Minneapolis, Minnesota 55402
Attorneys for Petitioner

St. Louis Law Printing Co., Inc., 812 Olive Street 63101 314-231-4477

INDEX

	Page
Statement of the Case	1
Reasons for Not Granting the Writ	3
1. There Is No Conflict With the Decisions of This Court or With Those of Other Circuits	3
2. The Court of Appeals Did Not Err in Its Determination of Nonobviousness Under 35 U.S.C. § 103	4
Conclusion	6

Table of Cases

Anderson's Black Rock, Inc. v. Pavement Salvage Co., Inc., 396 U.S. 57 (1969)	4
Dann v. Johnston, 425 U.S. 219 (1976)	3
Graham v. John Deere Co., 383 U.S. 1 (1966)	4
Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147 (1951)	4
Sakraida v. Ag Pro, Inc., 425 U.S. 273 (1976)	3

Other Authorities

35 U.S.C. § 103 ..... 4, 5, 6

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1977

No. 77-1640

CLARK EQUIPMENT COMPANY,
Petitioner,

versus

LOUIS J. KELLER and CYRIL N. KELLER,
Respondents.

RESPONDENTS' BRIEF IN OPPOSITION TO PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

NOW COME Respondents, Louis J. Keller and Cyril N. Keller, and respectfully pray that the petition for a writ of certiorari to the United States Court of Appeals for the Eighth Circuit be denied.

STATEMENT OF THE CASE

Petitioner's Statement with respect to the background of the litigation between the parties leading to its petition herein is reasonably accurate. In addition, it should be noted that the

license agreement between the parties grants to Petitioner an exclusive license under the three patents as to which a validity determination has been made by the Court of Appeals for the Eighth Circuit.

Respondent does not concur with Petitioner's argumentative statement as to the scope and content of the applicable prior art, the subject matter covered by the claims of the '503 patent and the differences between the claimed subject matter and the prior art. Each of the four claims of the '503 patent is directed to a transmission system for selectively transmitting forward and reverse driving power to propulsion wheels on opposite sides of a vehicle. In addition to an over and under drive chain for transmitting power from two sets of clutch plate assemblies to propulsion wheels, the claimed transmission system also comprises the cam actuating mechanism for the clutches shown in Figs. 3 and 4 of the '503 patent. (App. 1). The differences between the claimed subject matter of the '503 patent and the prior art supporting the determination of non-obviousness are summarized by the Court of Appeals at pages A-15, A-16 of Clark's petition.

The Court of Appeals affirmed the decision of the District Court upholding the validity of the '503 patent on the grounds that Clark failed to prove how the prior art could be combined to meet the claimed structure of the '503 patent without hindsight. (Petition, A-18, 19).

REASONS FOR NOT GRANTING THE WRIT

1. There Is No Conflict With the Decisions of This Court or With Those of Other Circuits.

In urging conflict with the decisions of this Court in *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273 (1976) and *Dann v. Johnston*, 425 U.S. 219 (1976), Petitioner has not accurately set forth the manner in which the synergism issue was treated by both the District Court and the Court of Appeals for the Eighth Circuit. The record clearly shows that a finding constituting a synergistic effect was made by the District Court and noted with approval by the Court of Appeals in affirming the holding of validity as to the '503 patent. That finding appears at B-31, 32 in the petition. In essence, there was a conclusion of an *unexpected result* flowing from the manner in which clutches were installed and actuated by a cam mechanism to "maintain steering and forward and reverse control in a smooth and effective manner from the operator's compartment."

In addressing the synergism issue, the Court of Appeals stated as follows:

> "A careful reading of the District Court's opinion reveals that determinations of the novelty and *unexpectedness of the combinative effect of the elements of the 503 patent* underlie the District Court's entire analysis of obviousness under § 103. Form would triumph over substance were we to hold this analysis inadequate for lack of specific reference to synergism, particularly in view of Clark's failure to place the issue of synergistic effect into issue prior to or during trial." (Petition, A-18, *emphasis added*).

Thus, contrary to Petitioner's assertion, the Court of Appeals did not conclude that no synergism determination was necessary. Having found that such a determination had in effect been made

by the District Court's giving "adequate consideration to the effect of the combination of elements in the 503 patent" (Petition, A-17), the Court of Appeals concluded that it need not address the question of whether a synergism analysis was mandatory.

The Court of Appeals noted in passing that the inventions involved in *Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147 (1951), *Anderson's Black Rock, Inc. v. Pavement Salvage Co., Inc.*, 396 U.S. 57 (1969) and *Sakraida*, supra, were of the simple variety. However, that was dicta. The Eighth Circuit most clearly did not decline to apply synergism to the '503 patent on any grounds, including the complexity of the invention. It found that the '503 patent was correctly held to be valid on the basis of a thorough and exhaustive application of 35 U.S.C. § 103 and the guidelines from *Graham v. John Deere Co.*, 383 U.S. 1 (1966), including findings constituting a determination of a synergistic effect. (Petition, A-15 through A-19).

Accordingly, the record below clearly refutes Petitioner's assertion that the Court of Appeals for the Eighth Circuit is out of step with other circuits or is not properly applying this Court's rulings involving the application of synergism in obviousness determinations under 35 U.S.C. §103.

2. **The Court of Appeals Did Not Err in Its Determination of Nonobviousness Under 35 U.S.C. §103.**

Petitioner misstates the record when it asserts that the difference over the prior art resided only in the substitution of disc clutches for an alleged "belt-as-clutch" drive. This assertion was made at trial and on appeal and rejected by both courts below. Petitioner continues to erroneously ignore the cam actuating mechanism for the clutches set forth in all of the

claims of the '503 patent. See the District Court's analysis of the claims of the '503 patent at B-26, 27 of the petition.

The "gap" in the prior art lay in the problem of how to install and actuate clutches, in the machine and mechanism of the type disclosed in the '503 patent, in such a way as to achieve smooth, safe and effective steering and driving control. That "gap" found by the District Court is referenced affirmatively and restated by the Court of Appeals at A-16 of the petition.

In attempting to prove obviousness under 35 U.S.C. §103, Clark relied at trial on a combination of Velo, Schreck and Hellwarth as prior art. However, even with the admitted application of hindsight (Petition, A-19 and Fact Finding 47 set forth at B-22), Clark's expert witness, Mr. Butler, was not able to reconstruct the claimed structure in reliance on these references as prior art in such a way as to arrive at an operative drive mechanism. See Fact Finding 46 at B-21 of the petition.

With respect to the question of nonobviousness under 35 U.S.C. §103, it is not clear what prior art Petitioner would have this Court now apply. Clark relied at trial on the Velo loader as its basic reference; however, the Velo loader was held to be an experimental machine, inapplicable as prior art. Clark has not challenged that finding below in its petition. In footnote 7 on page 14 of its petition, Clark appears to acknowledge that Velo is not prior art by referring to the substitution of disc clutches and actuator from Schreck and Hellwarth "for the prior art belt-as-clutch arrangement similar to the White patent." However, Petitioner never introduced any evidence as to how White might be relied on alone or in combination with Schreck and Hellwarth to allegedly meet the claimed structure of the '503 patent. (Petition, A-15 and B-28).

The record below clearly shows that Clark failed to meet its threshold burden of proving by substantial evidence how ele-

ments of the applicable prior art could be combined, without hindsight, to meet the claimed structure. (Petition, A-19 and B-29, 30 and 31). Having failed to even meet that basic burden, Petitioner was hardly in a position to argue the lack of a synergistic effect of the claimed combination. Indeed, Petitioner did not present any such evidence at trial. (Petition, A-17).

CONCLUSION

The fact is that Petitioner failed to meet its burden of proving by substantial evidence that the invention claimed in the '503 patent is obvious under 35 U.S.C. §103. Petitioner now seeks before this Court, as it did before the Court of Appeals for the Eighth Circuit, to save its case by asserting error by the District Court with respect to the application of synergism in the determination of nonobviousness under 35 U.S.C. §103. For the reasons set forth above, that assertion is simply not supported by the record below.

Accordingly, the petition for certiorari should be denied and such action is respectfully requested.

Respectfully submitted,

MALCOLM L. MOORE

HERMAN H. BAINS
WILLIAMSON, BAINS, MOORE & HANSEN
465 Pillsbury Building
Minneapolis, Minnesota 55402
Attorneys for Petitioner